FASTI TEMPORIS CATHOLICI

AND

ORIGINES KALENDARIÆ.

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FASTI CATHOLICI.

DISSERTATION XV. Continued.

On the Phœnix Period or Phœnix Cycle of the Egyptians.

CHAPTER XI.

On the Lunar Mansions of the Chinese.

Section I.—*On the Chinese cycle of* 28 *days, and on its relation to the hebdomadal.*

THE consideration of the lunar mansions of the Chinese properly belongs to that of the Chinese calendar: but as these mansions of the Chinese were derived from the Egyptians, we cannot omit so material an argument of the truth of the account which we have just given of the Egyptian mansions, as this which is furnished by the corroborative testimony of the Chinese also. We think it incumbent upon us therefore to enter on this subject at the present stage of our work; though, for the sake of brevity, we shall not insist upon every thing which might be adduced in illustration of it, but shall confine ourselves as much as possible to the simple proof of the derivation of the Chinese scheme of the mansions from the Egyptian. This is the fact which we are most concerned to establish; and which we hope to establish by a method of reasoning as plain and intelligible in the principle as direct and demonstrative in the application.

We begin with observing that, in addition to the cycle of sixty days, of which we have already given an account[a], the

[a] Diss. vi. ch. v. sect. iv. vol. i. 508.

Chinese have also a cycle of 28 days ; the antiquity of which too among them, for any thing which is certainly known to the contrary, seems to be equal to that of the 60 day cycle itself; so that the one would appear to be as old in China as the other, and both to have some time or other come into existence together, or at least neither of them much later than the other.

This cycle of 28 days is merely a noctidiurnal cycle; a measure of the constant succession of day and night, or of the period of 24 hours of mean solar time, or of any other kind of time, by revolutions of 28 perpetually : so that there is no difference in that respect between the cycle of 28 and the cycle of 60. This cycle of 28 too has its proper succession of feriæ, just as much as that of 60 ; and these feriæ are never confounded, no more than those of the cycle of 60. The feriæ of this cycle of 28 too have proper names, as much as those of the cycle of 60. But here the analogy between them ends. The cycle of 60 is not a measure of the hebdomadal cycle ; the cycle of 28 is. The cycle of 60 is not commensurable with the cycle of the lunar mansions : the cycle of 28, to judge from the number of its terms, (i. e. its feriæ,) might be this cycle of mansions itself.

Now this turns out to be actually the case. The names of the 28 feriæ of this Chinese cycle of 28 days are those of the 28 constellations also, which make up the Chinese system of mansions : and this fact being known, no one can hesitate to infer from it that the noctidiurnal cycle of 28 feriæ, and the cycle of mansions or constellations, 28 in number also, and called by the same names, must have come into existence together among the Chinese and must have been originally one the same as the other.

And with regard to the hebdomadal cycle, and to the relation of the Chinese cycle of 28 to the hebdomadal one of 7 ; the matter of fact, as ascertained by the actual comparison of the two together, is simply this : That a given feria in this Chinese order of 28 corresponds to a given feria in the hebdomadal cycle of seven, the same to the same, perpetually : so that one of these Chinese cycles of 28 feriæ is the measure of four of the hebdomadal in the usual order of *feriæ ;* and *vice versa,* four hebdomadal cycles of *feriæ,* in

their proper order, are an exact measure of one Chinese cycle of 28 *feriæ,* in their proper order too. The actual relation of the two cycles to each other may be seen from the following synopsis of both; which, after what has been explained, it will now be understood is perpetual; and having been once defined and determined in this manner must be supposed never afterwards to have varied.

Comparison of feriæ in the order of the hebdomadal cycle, and in the order of the Chinese cycle of 28, *under the names of the* 28 *lunar mansions, or* 28 *constellations.*

Hebdomadal.	*Cycle of* 28 *feriæ* [b].			
Feria	Feria	Feria	Feria	Feria
1 Sunday	4 Fang	11 Hiu	18 Mao	25 Sing
2 Monday	5 Sin	12*Ouey	19*Pi	26 Tchang
3 Tuesday	6*Ouey	13 Che	20 Tse	27 Y
4 Wednesday	7 Ki	14 Pi	21 Tsan	28 Tchin
5 Thursday	8 Teou	15*Kouey	22 Tsing	1 Kio
6 Friday	9 Nieou	16 Leou	23*Kouey	2 Kang
7 Saturday	10 Nu	17*Ouey	24 Lieou	3 Ti

The meaning of this scheme and of this comparison is that the *feria prima* in the hebdomadal cycle, (our Sunday,) in this cycle of 28, is represented by the feria 4ª, 11ª, 18ª, and 25ª perpetually; and *vice versa,* the feria 4ª, 11ª, 18ª, and 25ª, in this cycle, (each of them seven feriæ in their own cycle distant from one another,) are represented by the *feria prima* in the hebdomadal cycle perpetually: and so in every other instance, down to the *feria septima* in the hebdomadal cycle, the *feria* 10ª, 17ª, 24ª, and 3ª, in the cycle of 28.

SECTION II.—*On the continued use of the cycle of* 28 *days among the Chinese down to the present day, and on its continued agreement with the hebdomadal.*

We will now proceed to adduce some proofs of the relation in question; and of the continued agreement of the two

[b] Some of the names in the list subjoined will appear to be the same. These are the 6th, 12th, 17th, Ouey, the 14th and 19th, Pi, the 15th and 23d, Kouey. But Mons. Sylvestre, in a note to Gaubil, (cf. Traité de la Chronologie Chinoise, Introduction, p. vi,) observes that in the Chinese itself these names have different characters: so that they are really distinct in their own language.

cycles, after having been once adjusted to each other in the manner thus represented, down to the present day.

i. In a Chinese almanac (which formerly belonged to Mons. de Guignes[c]), dated in the 50th year of the reign of Kien Long or Khian-lung (A. D. 1785), the first new moon of the year had the mark of Pi, the 14th *feria* of the cycle of 28: and consequently that of one of those which should correspond perpetually to the 4th feria of the hebdomadal cycle, our Wednesday.

The Chinese new year's day in question, according to Mons. de Guignes[c], was Feb. 9 New style, A. D. 1785. And that agrees with Mr. Ideler's scheme of the Chinese calendar[d], in which the new year's day, A. D. 1785, is marked Feb. 9 New style also. The Dom. Lett. of the Gregorian calendar, A. D. 1785, as our tables shew, was B: and therefore Feb. 9 was Wednesday.

ii. In a calendar, quoted by Des Vignoles, according to Mr. Ideler[e], of the date of 1654, the new year's day (Feb. 17[f]) had the character Y attached to it; i. e. the representative of the 27th feria in the Cycle of 28, the 3rd in the hebdomadal. A. D. 1654 New style too, when the Dom. Lett. was D, Feb. 17 was Tuesday.

iii. Mr. Ideler specifies two more examples of the same kind of coincidence; one, A. D. 1802, the first new moon of which, Feb. 3, was marked by the character Tsan, the 21st feria of the cycle of 28, the 4th in the hebdomadal: and the Dom. Lett. that year being C New style, Feb. 3 the date of this new moon was Wednesday. The other, that of A. D. 1834; in which the new moon, Feb. 9, had the character Mao (the 18th feria of the cycle of 28), one of those which should correspond to the feria prima of the hebdomadal: and the Dom. Lett. of the year, New style, being E, Feb. 9 was the feria prima or Sunday.

It does not appear, according to Gaubil and Morrison, quoted by Mr. Ideler[g], that the Chinese make any use of the hebdomadal cycle at present, for the purposes of civil life; though the astrologers do so for purposes of their own: but

c Mémoires de l'Académie, xlvii. p. 426–428.

d P. 68.

e Ch. viii. note, p. 133, 134.

f P. 60.

g Ch. viii. 134.

the preceding examples shew that they still use the cycle of 28 days: which is the same thing as the hebdomadal; only under a different name. Father Gaubil, according to Mons. de Guignes[h], did not profess to know whether this cycle of 28 *feriæ* was an ancient one among the Chinese or not: but that proves nothing concerning its real antiquity. It proves merely that Gaubil himself in the course of his own researches had met with nothing calculated to throw light on that question. There is no reason to doubt of the antiquity of this cycle in China; of that antiquity, at least, which really belongs to it; though even this, however considerable in itself, in comparison of the exaggerated claims which the Chinese have advanced in other cases of a similar kind, might very well pass for modern.

It is a conceivable and certainly a possible case that a cycle of 28 feriæ, equivalent to four cycles of seven feriæ, and in the first instance absolutely the same as four hebdomadal cycles themselves, having been introduced into China, in the course of time would supersede the cycle of seven in that country; and cause it to fall into disuse, even though it might have been previously in use. It would supersede it in appearance at least, and lead to its being no longer formally continued; though in reality, while this cycle of 28, founded upon it and originally the same with it, remained in use, the cycle of seven could not cease to be in being also. We have shewn in a former part of our work[i], from the testimony of the most authentic and trustworthy of the Chinese writers themselves, that the hebdomadal cycle, and even the sanctity of the seventh day in that cycle, did not cease to be known and respected in China, almost down to the epoch of the correction of their calendar.

It is not conceivable however that this Chinese cycle of 28 *feriæ* could have come into use among them independently of any connection with the hebdomadal cycle of seven. It could not be accident which determined the principal

h Mémoires, xlvii. p., 426. loc. cit. See however Lettres Édifiantes, xxvi. 79. Mons. de Guignes (p. 427) observes, "J'ai entre les mains divers almanachs Chinois où tous les jours de chaque mois sont ainsi désignés: (i. e. in the order of the cycle of 28:) et ce cycle de jours court dans toute l'année, l'un succédant à l'autre régulièrement et sans interruption."

i Diss. vi. ch. ii. sect. i. vol. i. 405.

feriæ in this cycle, Fang, Hiu, Mao, and Sing, to the principal feria in the hebdomadal, (which is the feria prima,) perpetually. If the hebdomadal cycle was older than this cycle of 28, it was incomparably older; it must long have been known, and long have been in use, before that was ever thought of. And though we could not infer that a cycle of 28 feriæ under any circumstances must necessarily have been derived from one of seven; a cycle of four times seven hebdomadal feriæ, properly so called, in the shape of one of 28, no one could hesitate to infer must have been derived from the hebdomadal one of seven. It must be the hebdomadal of seven itself; only in another form: and therefore it must have been the same with it at first.

Section III.—*On the connection of the Chinese cycle of* 28 *with the lunar mansions.*

The antiquity of the hebdomadal cycle among the Chinese however is not the question with which we are particularly concerned at present. There can be no doubt that it entered their cycle of 28 at first in its proper and legitimate form; and that it has continued to do so ever since: from which we have a right to infer that the hebdomadal cycle is as old in China as this cycle of 28; and even that the cycle of 28 was purposely adapted in China to the cycle of 7, and that the cycle of 28 was never for a moment independent of that of seven.

The fact then being thus established that the cycle of 28 days must have been associated in China with the cycle of 7 days from the very first; there can be even less doubt, if possible, concerning its connection with the cycle of lunar mansions from the first also. The number of the feriæ in this cycle, which is the same with that of the mansions, and still more the names of the feriæ of the cycle, which are absolutely the same with those of the mansions among the Chinese, are decisive of that question. The Chinese themselves would be the first to admit that their cycle of 28 days in name and profession was the cycle of their mansions also.

And yet, notwithstanding this fact, it does not appear that the cycle of 28 days either has at present or ever had here-

tofore any reference whatsoever to the course of the moon; or to any known period of the moon; not even to its tropical or sidereal or anomalistic ones, which approach most nearly in terms to the length of this cycle of 28 days, The civil calendar of the Chinese is lunar, and has been so for 2500 years and upwards; and this cycle of 28 days always has run through it, and still runs through it, from beginning to end: and yet it never corresponded heretofore, nor ever corresponds at present, except per accidens, to the lunar reckoning of the calendar itself. It follows that, whensoever this cycle was introduced into the calendar, it was not intended to be a lunar cycle or a lunar measure, except in name; it was intended solely as a noctidiurnal cycle. It borrowed the number, and order, and names of its feriæ nominally from a lunar cycle, that of the mansions; but in reality from the hebdomadal. It might be nominally therefore a lunar cycle; but in reality it was a noctidiurnal one.

The 28 constellations of the Chinese, which are also their 28 mansions, are laid down on the equator, not on the ecliptic. The equator is divided by the Chinese into $365\frac{1}{4}$ equal parts, each of which is one Chinese degree in extent; so as to correspond to the number of days in the mean Julian year of $365\frac{1}{4}$ at the rate of one such degree to a day[j]. This mean Julian year too is equally divided by them into four quarters, of 91 d. 7 h. 30 m. each[j]. It is a necessary consequence of these distinctions, that every seven of their mansions or constellations contain a fourth part of the equator in degrees, and a fourth part of the mean Julian year in days[j]. And the rule, which they observe at present in disposing of the several mansions all round the equator, and all through the year, is such[k], that the mansion, among the seven assigned to each quarter of the year respectively, in which the equinoxes and solstices fall, is the fourth or middle one of the seven themselves: though this does not appear to have been always the case; but, on the contrary, as was naturally to be expected, the first mansion of each quarter was the equinoctial or solstitial mansion. In

[j] Gaubil, Traité, Preface vi. 256. 257: 249 note: 250. 246. Lettres Édifiantes, xxvi. p. 77–79. 248. 269. Cf. the Table, p. 289. Martinius, i. 50. See also the Chinese calendar of Mr. Ideler, ch. iv. p. 99.

[k] Gaubil, Traité, 257: cf. note 2. Lettres Édifiantes, xxvi. 77.

effect however both rules amount to the same thing. In either case it is agreed that the mansions which were thus characterised as the principal or leading ones in each division, those of the cardinal points of the year itself, were the same with those four, which, in the above comparison of the Chinese cycle of 28 feriæ with the hebdomadal one of 7, are seen to fall on the feria prima of the latter; viz. Mao, Sing, Fang, and Hiu[l]: of which Sing had anciently also the name of Niao[m], and Fang that of Ho[m]: Mao denoting the vernal equinox, or beginning of spring; Sing the summer solstice, or beginning of the summer quarter; Fang the autumnal equinox, or beginning of the autumnal quarter; Hiu the winter solstice, and the beginning of the winter quarter.

Section IV.—*On the date of the introduction of the lunar mansions of the Egyptians among the Chinese.*

These observations and these explanations having been premised, we proceed to remind the reader of what has been stated, and in a great measure proved already, in a former part of our work[n]; viz. That the Chinese made the first actual permanent change of the primitive calendar among themselves in particular, in B. C. 657, when they substituted for the primitive equable solar year the same kind of lunar calendar which they have continued to use down to the present day; and which is in fact a lunar calendar virtually regulated by the Hipparchean period of 304 mean Julian years. And as a lunar calendar of that kind necessarily supposes a solar one, corresponding to it, the introduction of the former among the Chinese was virtually, if not *de facto*, the introduction of the mean Julian year among them also.

We shewed indeed that they had among them the Apis cycle, the natural lunar year of the equable solar year, even before this; but not, as it appeared, from a very remote point of time before it, nor possibly in every part of China alike. And though it does not appear that that was immediately laid aside as soon as the lunar calendar, such as we have described, distinct from this, was brought into use; yet

[l] Cf Lettres Édifiantes, xxvi. 77, 78. p. 257. Lettres Édifiantes, xxvi. 75.
[m] Gaubil, Traité, 256, 257: note 1.
[n] Diss. vi. ch. v. sect. iv. vol. i. 508.

there cannot be any doubt that in the course of time both the primitive lunar and the primitive solar year disappeared from the stage in China; and nothing was left in possession of the calendar there but the same lunar and the same solar year which are still in possession of it at this very day; the latter indeed only virtually, or in and through the former.

It has been shewn too that they had the sexagesimal day-cycle among them even before the date of this correction in B. C. 657, though not the sexagesimal annual cycle; but that from this time forward (B.C.657) they had each of these things in use among them in conjunction; their cycle of 60 years, their cycle of 60 days, and their lunar Metonic calendar. It remains to shew, in like manner, that it is from the same epoch that we are to date the possession and use among them also of the cycle of lunar mansions, the cycle of constellations, and the cycle of 28 days virtually the same as the hebdomadal one of seven, and virtually, if not actually, substituted for it.

It is a remarkable fact that, though the beginning of the civil year of the Chinese is not known to have been ever attached to the autumnal equinox, or to the autumnal quarter in general, but always to the spring equinox, or to the winter solstice, or to some natural term between the two; yet the mansion Fang (the middle constellation or mansion of the seven assigned to the autumnal quarter) appears to have been recognised from the first as the principal mansion. In the modern lists of mansions indeed they are reckoned from Teou[o]; but simply because that coincides at present with the winter solstice; and therefore with the present beginning of the civil year in China: but in all the old lists of the mansions, it is agreed, the recension began with Kio, three mansions exactly before Fang; so that Kio being the first in order, Fang must have been the fourth.

Concerning the true reason why Kio was constituted the first mansion, we shall have something to say by and by. Even to admit the fact of this constitution from the first, (and there seems to be no reason to doubt of it,) and consequently that Fang was only the fourth in order from the first; yet the importance and prominency which the Chinese

o Gaubil, Traité, p. 257.

themselves have always assigned to this mansion in particular are sufficient intimations that Fang in reality was always regarded as the principal mansion; and as virtually, if not actually, the first. And this is confirmed by the testimony of the hebdomadal cycle; which, as we have seen, entered this cycle of 28 from the first: the feria prima in that cycle coinciding with Fang, and not with Kio.

Now the lunar mansions of the Egyptians, considered as 28 equal divisions of the year of 365 or of 366 days, as much as 28 equal divisions of the ecliptic or of the equator, were to all intents and purposes a noctidiurnal cycle of 13 days perpetually, and sometimes of 14 days: and the Julian date of any one of the number being given, it would be easy to assign from that the corresponding date of each of the rest in its order all through the year. At the last revision of the mansions, B. C. 848, the first Julian term attached to the cycle was April 1: which, after B. C. 672, would become the same thing as March 31: and one scheme of cycles of 13 days which set out from either of these terms, either April 1, or March 31, having been defined and laid down all round the year, such a scheme was capable of being perpetual: for a cycle of days, and nothing more, attached to such and such Julian terms all round the year, in its own nature may be and must be perpetual. There can be no doubt that every type of the mansions, from their first institution in B. C. 1847 to their final revision in B. C. 848, must have been provided with a cycle of dates of this kind, 13 terms, and sometimes 14, asunder in particular instances; which were first and properly intended to mark the course of the sun in and among the mansions, and in relation to the stars in and about the mansions: dates consequently, which required to be revised and laid down afresh at the epoch of successive revisions of the sphere, in the manner which we have exhibited in our types of that description at each of the epochs in question; but which having been once revised and laid down in this manner, at the epoch of a particular readjustment of the sphere, would be permitted to remain undisturbed as long as the sphere itself: and that, according to the proper Phœnix rule, would be for 500 years at a time.

Now this being supposed to have been done at the epoch

of the last revision of all, B. C. 848; then, if the sphere never underwent any fresh revision afterwards, these dates would remain nominally such as they were left at the last revision among the Egyptians themselves; and that appears to have been actually the case; as the particular instances of such dates which we have already considered (the date of the mansion Claria, and the date of the cubit mansion) suffice to prove. Or if the sphere, as revised and attached to these dates in B. C. 848, passed to other nations soon after that time, these dates would pass to them along with it exactly as they had been left at the last revision: and they would pass to them, in the first instance, in the shape of so many Julian dates of so many cycles of days and nights 13 terms or 13 feriæ asunder, and nothing more, from the beginning to the end of the year: and they might be received by them as such, and treated accordingly.

It is evident therefore, under these circumstances, that a cycle like this of the mansions, consisting of 28 terms perpetually, regarded as a solar or sidereal cycle of that number of terms, might be considered to consist of a succession of noctidiurnal cycles, each of them 13 days in length, of which there would be 28 perpetually in every year; and regarded as a lunar cycle of that number of terms, might be considered a noctidiurnal cycle of 28 days, of which there would be 13 perpetually in every year. And this view and construction of such a cycle would be more in unison with its nominal character and designation as a cycle of lunar mansions; insomuch as the moon actually moved through one such mansion in one day and one night: and one lunar mansion and one noctidiurnal cycle were almost convertible terms.

Now the date of the correction of the Chinese calendar being B. C. 657, 15 years later than B. C. 672; if the mansions passed to the Chinese at that time, in the state in which they had been left at the last revision, B. C. 848, their Julian dates would be found to have dropped one day; that of the first from April 1 to March 31, and so on; on which principle, the Julian date of the xvith mansion, which B. C. 848 was left attached to October 14, B. C. 657 would be October 13.

If then the mansions really passed to the Chinese at or about this time, any time in short between B. C. 672 and B. C. 657; without calling in question the fact of the commencement of the reckoning of the mansions in their calendar from Kio—the point which we have to ascertain is to which of the Egyptian mansions would any of the principal terms in the Chinese system, Fang, Mao, Sing, and Hiu, be found corresponding at this time? We answer that question by referring to the synopsis, proposed supra[h]; in which the Chinese mansions under their proper names are exhibited side by side with the Egyptian.

It appears from this that, as reduced to the first and original type of the Egyptian mansions, Mao corresponded to the ist, and both at that time to the mean vernal equinox: Sing to the viiith, and both to the mean summer solstice; Fang to the xvth, and both to the mean autumnal equinox; Hiu to the xxiid, and both to the mean winter solstice: and as reduced to the third type, that of B. C. 848, we find the Julian date of Mao falling on April 14=13; that of Sing on July 15=14; that of Fang on October 14=13; and that of Hiu on January 13=12.

The lunar epoch of the Chinese calendar, B. C. 657, was attached to Feb. 16; which, as the same synopsis shews[h], at that time was the tenth day of the mansion Che; the xiiith of the Chinese mansions reckoned from Kio, the xxvth of the Egyptian of type iii. The place of Fang then, relatively to Che, at the epoch of this correction, must be sought for in B.C. 658, not in B.C. 657; the natural order of the mansions being from Kio to Che, not from Che to Kio. If so, in the first instance from B. C. 658 to B. C. 657; not from B. C. 657 to B. C. 656.

Now what was the hebdomadal character of the mansion Fang, B. C. 658? The same as that of its Julian representative, October 13, the same year. And what was that of October 13, B. C. 658? The Dominical letter was F: and therefore October 13 was the feria prima or Sunday. If so the mansion Fang too, B. C. 658, was identical with the feria prima: and that being the case, no one requires to be told, after what has been already explained, that in the reckoning

[h] Vol. iii. p. 552.

of hebdomadal feriæ in terms of this Chinese cycle of mansions, beginning with the feria prima in the one and with Fang in the other, Hiu, Mao, and Sing would be the feria prima also; Sin, Ouey, Pi, and Tchang would be the feria secunda; and so on with the rest in proportion.

Now this is abundantly sufficient to shew in what manner each of these cycles, the hebdomadal of seven feriæ and the Chinese mansion cycle of 28, regarded and treated alike as noctidiurnal cycles, and as nothing more, might come into existence in a certain state of relation to each other in this year, B.C. 658, and on this day, October 13. And when they had thus set out together, and in this state of relation to each other, in this year, and on this day, though no one could have ventured to say, before the experiment had actually been tried and tested by time, that they would preserve the same relation to each other ever after; yet neither can any one now doubt that they have done so, who has only paid attention to the proofs of that fact which we proposed and stated supra[i]. We have only to suppose that the Chinese determined, at this time, B C. 658, when they were preparing to make such a radical change in their calendar also, to adopt a perpetual noctidiurnal cycle, composed of the 28 terms of the cycle of mansions, just borrowed from the Egyptians; yet not so as to discard the hebdomadal cycle known to them from the first, and probably still used by them at this very time; but on the contrary to include it in that, and from that time forward to amalgamate one with the other: and that they took advantage of the coincidence just pointed out, (the most convenient for their purpose which could possibly have fallen in their way,) when the xvith term in the Egyptian cycle and the ivth in their own were both falling on the feria prima of the hebdomadal cycle, and both on October 13. This is all which we have any occasion to suppose, to account for the subsequent effect: and this the facts which we have just produced do appear to warrant us in supposing. The rest might be left to the natural course of things. No nation of antiquity seems to have had a greater predilection for the noctidiurnal cycle, as a measure of time *per se*, than the Chinese. None has

[i] Section ii p. 3.

been more tenacious of its own institutions and customs: none more averse to change: none more observant of what had once been solemnly and deliberately sanctioned and prescribed by it.

SECTION V.—*On the date of the planetary cycle of the Chinese.*

We have not yet however explained every thing connected with the first introduction among the Chinese of this peculiar noctidiurnal cycle of 28 terms, made up of the hebdomadal cycle and of the cycle of mansions; and in particular why it was appointed to begin on the fourth term of the cycle itself, i. e. on Fang, not on the first, i. e. on Kio. This involves another curious and interesting point; which we must proceed to explain.

We meet with the planetary names, applied to the feriæ of the hebdomadal cycle, all the world over, (and especially in the east;) and always in the same order; always in connection with the same feriæ of the hebdomadal cycle: and Bailly might reasonably express his surprise at the uniformity of this phenomenon every where, under such different circumstances in particular instances[i]. The Chinese are no exception to this general rule. The planetary cycle enters their cycle of 28 in the same order as the hebdomadal, and with the names of the former attached to the same feriæ of the latter, as in every other instance perpetually[j]. So that, when the hebdomadal cycle was incorporated with the cycle of 28, its feriæ must have been already known among them by their usual planetary names at present. Yet Gaubil has observed on this point, that the appropriation of these names to the feriæ of the hebdomadal cycle, and this stated conjunction of one with the other in China, is not of indefinite antiquity in that country; but on the contrary comparatively recent: and this we shall see is strictly the case. Les noms de Soleil, Lune, Mars, Mercure, Jupiter, Vénus, Saturn, pour les sept jours de la semaine ne sont connus et introduits à la Chine, que depuis Tay-tsong, deuxième empereur de la dynastie Tang[k]: which he dates in B. C. 627.

[i] Histoire de l'astronomie ancienne, liv. iii. §. iii. p. 62. note.

[j] Martinus, i. 51. cf. Bailly, Astronomie ancienne, Éclaircissemens, ix. § xxi. 493.

[k] Lettres Édifiantes, xxvi. p. 174.

We shall now proceed to shew when they were really first introduced.

These planetary names for the days of the week not being older even in Egypt, where they were first imposed upon them, than B. C. 798, they could not be older in China: and whensoever they came into China, it must have been ultimately, if not directly, from Egypt. Nor can any thing be more probable in itself than that, when they received the cycle of mansions from the Egyptians, the Chinese would receive from them the planetary cycle also. This Chinese planetary cycle, applied to the hebdomadal, is altogether the same as the Egyptian. The sun represents the feria prima in this, as it does in that; the moon, the feria secunda, Saturn the feria septima: and so on. This being the case, the 4th term, in their noctidiurnal cycle of 28 terms, as the feria prima being represented by the sun, the 1st as the feria quinta must be represented by Jupiter. Referred to the planetary cycle, the 28 days' cycle, beginning and ending with the feria 5[a] of the hebdomadal cycle, begins and ends with Jupiter perpetually.

Now from B. C. 798 to B. C. 658 there were just 140 years; and in these 140 years there would be three cycles of 36 years complete, and 32 years of a fourth. We shewed[k] that the cycle of the planets among the decania and decads of the sphere was a cycle of 36 years. Consequently, the planet Saturn being in the middle decad of Leonton, August 8 B. C. 798, attached to the feria 7[a]; it would be in the third decad of Parthenon, B. C. 658, attached to the first feria septima of that decad, the third day of the decad, September 14, that year. Jupiter would be in the first decad of Zygon, dated September 22; attached to the first feria quinta, September 26: Mars in the second decad of Zygon, dated October 2; attached to the first feria tertia, October 8: and Sol in the third decad of Zygon, dated October 12; attached to October 13, as the first feria prima of the decad.

These coincidences will appear more plainly from the following scheme.

[k] Ch. viii. sect. ix. vol. iii. 496.

B.C. 658 Dom. Lett. F. *Position of the Planets among the Decania of the signs, in Parthenon and Zygon.*

Decan.	Parthenon.	Planets.	Fer.		Mansions.		Fer.	Planets.
iii	Sept. 12.	Saturn	7	Sept. 14.	i Kio.	Sept. 4.	4	Mercury.
						— 5.	5	Jupiter.

Decan.	Zygon.	Planets.	Fer.		Mansions.		Fer.	
i	Sept. 22.	Jupiter	5	Sept. 26.	ii Kang	Sept. 17.	3	Mars.
ii	Oct. 2.	Mars	3	Oct. 8.	iii Ti	Sept. 30.	2	Luna.
iii	Oct. 13.	Sol	1	Oct. 13.	iv Fang	Oct. 13.	1	Sol.

It appears from this scheme that Saturn, at this particular juncture, would be found in possession of the mansion Kio; and this coincidence, in our opinion, would be sufficient to determine the Chinese to begin the reckoning of the mansions from Kio; Saturn being the leading planet in this cycle of planets among the Decania and signs perpetually. In this point of view however, and in this relation to the planets, the mansions would have to be regarded as cycles of 13 days; and every term in the cycle as the representative of a noctidiurnal period of that extent. The question is, what would be the state of the case at the same time in relation to the hebdomadal cycle? It appears, from the above, that as the first term of Fang was falling on the feria prima, represented by Sol; so the first of Ti, the next before that, was falling on the feria secunda, represented by Luna; and the first of Kang, the next before that, on the feria tertia, represented by Mars; and the first of Kio, the next before this, was falling on the feria quarta, the planetary representative of which was Mercury, not Jupiter. It is manifest however that, in going back with the terms of the planetary cycle, you must come to Jupiter next to Mars, not to Mercury: and in going back from October 13 to September 4, you must come to September 5, before you do so to September 4. And as both these terms, both September 5 and 4, made part of the same mansion Kio, already determined as the first in the order of mansions because of its being in possession of Saturn; they could not do otherwise than stop at the second term in this mansion Kio, which was falling on the feria quinta, instead of passing on to the first, which was falling on the feria quarta. By these means and on this principle it is manifest that Kio would be attached

to Jupiter in the planetary cycle, just as Kang was to Mars, Ti to Luna, and Fang to Sol. These points being settled, every thing else would follow as matter of course.

There must have been some reason to determine the Chinese to reckon their cycle of 28 from Kio ; and some reason too totally different from any regard to the calendar, or to the seasons of the natural year. Their calendar was intended to begin in Aquarius, and in the mansion *Che.* Why then did they not make *Che* the first mansion? The autumnal equinox was falling in *Ti* : why then was not *Ti* made the first mansion? The first feria prima of the hebdomadal in terms of this 28 days' cycle was falling on *Fang* : why was not *Fang* then made the first mansion? We may ask a variety of questions of this kind. It is manifest that nothing will explain the fact itself but an arbitrary and positive appointment, founded on no good reason whatsoever, or on some such reason as that which we have just pointed out: viz. That Saturn was in possession of Kio, at this very time, considered as one of the mansions, and therefore Kio must take precedence among the mansions, as he had precedence among the planets ; and Jupiter also was in possession of Kio, considered as a cycle of 13 feriæ, the first term of which was the feria quarta, and the second the feria quinta. The former of these would go to Mercury as the representative of the feria quarta, and the latter to Jupiter as that of the feria quinta. Kio therefore must be assigned to one of these two in the order of the cycle of planets, either to Mercury or to Jupiter ; between which the Chinese, for various reasons, could not hesitate to decide in favour of Jupiter.

SECTION VI.—*Confirmation of the fact of the derivation of the Chinese mansions from the Egyptian, and of its date, by other proofs.*

It is in our power to confirm the conclusion to which we have just come, respecting the origin of these Chinese mansions, and the date of their introduction into China, by other proofs, which we shall proceed briefly to subjoin, before we take our leave of this subject.

i. The cycle of 28 feriæ, the same in all respects as four cycles of hebdomadal feriæ, having thus been instituted

B. C. 658, and appointed to bear date either from Kio, the first mansion, and the *feria quinta,* Sept. 5, or from Fang, the fourth, and the *feria prima,* Oct. 13; it would be found that, after four revolutions of the cycle itself, the fourth mansion, Fang, the first stated representative of the *feria prima,* would again be falling on the *feria prima,* Feb. 2; and Mao, the third stated representative of the same, on the *feria prima,* Feb. 16, B. C. 657: the date of the lunar correction, introduced in this year for the first time also. And as this correction was purposely attached to the luna prima of spring, and Mao was the proper representative of the spring mansion in the cycle of mansions, these coincidences too no doubt would have their weight; nor is there any reason to suppose that what would thus actually take place was not foreseen, and was not purposely intended.

ii. Though the reckoning of the mansions, whether from Kio or from Fang, thus began at the end of the summer, or at the beginning of the autumnal, quarter; the passage of the mansions over the meridian was always referred to the opposite quarter of the year; and as so referred, appears to have been purposely determined to the mansion Che.

That the Chinese attached much importance to these passages, and were particularly careful to notice the order in which they took place; we learn from Gaubil[1]. The most observable circumstance about the phenomenon is that the mansions were supposed to pass the meridian not at noon, or at midnight, but in the morning twilight, or at the dawn of day. Now we do not see how this could be the case, unless these passages had been determined in the first instance by the fact of the passage of Che in particular at noon; the consequence of which would be that the first passage of Fang, (the most important mansion,) would take place in the morning twilight.

The mansions being all laid down on the equator, their passages must all be reckoned in right ascension, at the rate of one degree every 4 minutes. The scheme which we have exhibited is as applicable to the equator as to the ecliptic. In type iii, the distance from Che to Fang is as follows:

[1] Traité, 107: cf. Lettres Édifiantes, xxvi. 230: 163, 164.

Longitude of the mansion Fang	..	193° 54′ 29″·541
Longitude of the mansion Che	..	309 37 20 ·970
	Interval =	244 17 8 ·571
		= 16 hours, 17 m. 8 sec. 34 th. in time*.

On this principle, the sun being supposed to be in the first degree of Che, and passing the meridian at noon, (as would be the case Feb. 7 B. C. 657,) the first degree of Fang would pass the meridian 4 h. 17 m. 8 s. after midnight, on Feb. 8; which, at that time of the year, would nearly coincide with the dawn of day or beginning of twilight. This coincidence, in the first instance of all, was competent to determine the rule of watching the passages at dawn; and particularly that of Fang. On this principle however, though the order of the mansions was reckoned from Kio, and the order of feriæ from Fang, the order of meridian passages was virtually reckoned from Che, and from noon; that is, virtually from the epoch of the lunar correction of the calendar itself, made at the same time; which was falling in Che. The name of this mansion Che itself is peculiar. It is the name of a particular mansion, the xiiith from Kio, as we have seen; and yet it is the name of the mansions in general also: and the meaning of the name in the Chinese is simply that of *hospitium*, hotel, lodging; that is, mansion or station itself. Les Chinois, says Gaubil[m], ont divisé le mois lunaire en 28 parties dites Che, hospice, logement. Les 28 constellations sont aussi dit les 28 Che. Now this must designate the xiiith mansion, which bore that name, as the most important of all in one respect; that is, in connection with the moon. If the mansions or stations of the moon were *Che* in general, and this mansion was *Che* also in particular, none could have been more emphatically the lunar mansion or lunar *hotel* than this. Kio could not be more connected with the order of the names, nor Fang with the order of the

* Mr. Ideler, Chinese Calendar, (ch. iii. p. 103.) has given a table of the right ascensions of the mansions, adapted to B. C. 140. In this we have

R. A. of Fang	..	208° 54′
R. A. of Sche or Che		319 41
Difference ..	..	249 13 = 16 h. 36 m. 52 s.

m Lettres Édifiantes, xxvi. 243. note 1.

feriæ, than Che with the order of the mansions, in this cycle of 28. This is explained at once by the fact that the lunar correction of the calendar, and consequently the first lunar mansion itself, properly so called, fell in Che.

Gaubil has given an account of a speech supposed to have been delivered by a Chinese mandarin, a contemporary of the emperor Suen-Vang, who began to reign, according to the Chinese chronology[n], in B. C. 827. It was addressed to that emperor in person; who had suffered an ancient custom of the country, in which the emperors themselves were bound to take a prominent part, to fall into desuetude: and the object of the address was to remind him of the omission of which he had been guilty, and to prevail upon him to repair his fault. It was recorded in the book Koue-Yu; and entitled, according to Gaubil's version, Discours d'un grand du temps de Suen-vang sur la cérémonie du labourage de la terre. It begins as follows:

"Anciennement le président du tribunal de l'histoire et de l'astronomie examinait le temps où le matin la constellation *Fang* passait par le méridien, et celui où le soleil et la lune devaient être dans la constellation *Che*. On savait le jour où le soleil devait se trouver au point du ciel où commence le printemps, et la nouvelle lune qui désigne la première lune du printemps. *Neuf* jours avant on avertissait le mandarin préposé au labourage"—and so on.

Let the reader take notice of what is here said about the new moon in *Che*, and nine days' notification beforehand of the approaching ceremony to the mandarin who superintended the agricultural department of the state. This must mean *nine* days before the conjunction; the day of the conjunction itself being the stated date of the annual ceremony, in which the emperor himself was bound to take a prominent part, and which is described in the sequel of the same discourse[o]. If this rule was ever prescribed, and ever actually observed, we may take it for granted it must have been so in the first instance of all, when both the mansions and the lunar correction came into being together, B. C. 658–657. Now in this year the date of the conjunction was Feb. 16;

[n] Traité, 38, 39: cf. 102: Lettres Édifiantes, xxvi. 162, 163.

[o] Cf. also Martinius, viii: Imperator iv. p. 329.

and nine days before that, Feb. 7, was the date of the mansion Che. Can any one doubt then that this coincidence determined the rule in question, relating to the nine days' notice of the ceremony beforehand? and to the observation of the passage of Fang, nine days before the ceremony too? In our opinion, this testimony is decisive both of the lunar date of the correction, Feb. 16, and of the date of the mansion *Che*, Feb. 7, B. C. 657 *.

iii. It appears from Martinius' Historia Sinica[p] that the fable of the Phœnix must have passed into China, and must have been adopted by the Chinese; and what is more, the first appearance of the Phœnix must have been purposely set back by them to the reign of one of their earliest kings, the fourth from Fohu; whom Martinius calls Xao-hauus, and Gaubil Chao-Hao, or Kin-Tien[q], and whose reign he dates B. C. 2598. This prince, according to the Chinese[p], was especially fond of birds: and was said to have borrowed the badges and insignia of office, and the outward distinctions of rank and dignity, (still retained among them,) from the feathers of birds, and from the different colours of their plumage: "Aves autem," says Martinius, "Xao-hauus ceteris animantibus idcirco prætulit quod sub initium imperii ejus solis avis apparuit, cujus adventu felicitatem regno portendi vulgo existimant. quod si hæc avis diu non sit visa Imperatoriæ familiæ interitum et futuros bellorum motus ominantur. quænam vero sit hæc avis non liquet. ex forma qua eam pingunt aquilam crederes, nisi plumarum mira et dis-

* Another curious coincidence, connected with this traditionary observance, is that as Gaubil states, Traité, p. 102, it was to be made at the *Li-tchun*; which is the Chinese name for the 24th part of the equator, and in this instance 45 days and a few hours before the equinox of spring:

B. C. 657 we have Che	Feb.	7	
	Add ..	45	
		52	
	Subtract	29	B. C. 657 being leap-year.
Equinox of spring, i. e. the first point of Aries,	March	23	

And this was really the first of the Krion of Mazzaroth, B. C. 657.

p i. 32. iv. Imperator Xaohauus.

q Traité, p. 10.

color varietas obstaret. Phœnicem ut esse suspicer ejus raritas persuadet. Sinæ *Fug-ho-ang* vocant."

Now if the Chinese adopted this fable as soon as they became acquainted with it, and carried it back to the reign of this early king; we cannot be surprised to find that when they got possession of the Egyptian mansions, though only at first in the form of type iii and of the epoch of B. C. 848; they set them too back to a much earlier date, the epoch of the reign of their Yao, the most famous of all their kings; the beginning of whose reign those who have laboured most to reduce Chinese chronology to something like consistency, and to something like probability, have not been able to fix to an earlier date than B. C. 2357[r], only nine years earlier than the date of the deluge B. C. 2348.

That there was ever such a king as Yao among the Chinese, we are not prepared to deny: but that their own account of his time and of the chronology of his reign is supposititious and false, we do not hesitate to affirm: and we think the testimony of the Egyptian mansions, received in reality by the Chinese only B. C. 658, yet set back on purpose to the beginning of his reign, is sufficient of itself to prove its purely hypothetical origin. The tradition which the Chinese themselves connect with their Yao is that he was their reformer and legislator on almost every subject; the author of their system of time, and of its peculiar rules; the first to discover and to make known to them the mean Julian year of 365¼, and the Metonic cycle or lunæsolar period of 19 years; the first to devise and lay down the mansions and constellations, both under the name of the Che, and to distribute them according to their peculiar rule among the seasons of the natural year[s]. In particular, that he designated Mao, from the first, as the constellation of spring, Sing as that of summer, Fang as that of autumn, and Hiu as that of winter; appointing that the spring quarter should be dated from the conjunction of the sun with the first star of Mao, the summer quarter from the conjunction of the sun with the first star of Sing, the autumnal from its conjunction

[r] Gaubil, Traité, p. 12.

[s] Traité, 12, 13, 14. 84. 107. 172. 249, 250. 256, 257: cf. 246, 247. Lettres Édifiantes, xxvi. p. 74–82: cf. 87. 91, 92. 133, 134. 248. 267. 269.

with the first of Fang, and the winter quarter from its conjunction with the first of Hiu.

As the Chinese quarters of the year are all of the same length, and each is one fourth of 365 days one quarter long; the date of any one of them being determined, it determines that of each of the rest. Gaubil had already concluded that the winter quarter must have been thus attached to Jan. 7 or 8, and the autumnal to October 7 or 8; at a time too not much later than that of Yao[†]: and these dates would fix the spring quarter to April 7 or 8, and the summer quarter to July 7 or 8; the beginning of the quarter, in each instance, being the equinox or the solstice also.

Now let the reader carry his eye from the constellations or mansions Mao, Sing, Fang, and Hiu, in the Chinese type of B. C. 847, to the corresponding mansions in the first Egyptian type, that of B. C. 1847; and he will at once perceive that the dates, thus ascertained by Gaubil from other data and testimonies, are nothing more or less than the original dates of these four mansions in the first or original type of the mansions themselves; that of Mao, April 8 B. C. 1847, = April 7 B. C. 657; that of Sing, July 9 B. C. 1847, = July 8 B. C. 657; that of Fang, October 8 B. C. 1847, = October 7 B. C. 657; and that of Hiu, January 7 B. C. 1847, = January 6 B. C. 657: each of them too, for this particular epoch of B. C. 1847, the actual dates of the mean equinoxes and of the mean solstices, as reckoned according to a cyclical or positive rule *.

* From our general tables, B. C. 1847, and from the table of ingresses among the other supplementary tables, we have for the meridian of Jerusalem, that year,

		h.	m.	s.	th.
The mean vernal equinox, April 8	at	12	47	52	48
The mean summer solstice, July 8	—	20	15	5	24
The mean autumnal equinox, Oct. 8	—	3	42	18	0
The mean winter solstice, January 7	—	11	9	30	36

The difference of meridians, between Jerusalem and Pekin, being 5 h. 25 m. 9 sec. *east*, these dates would fall on the same days, for the latter meridian, in every instance but that of the mean summer solstice, which for the meridian of Pekin would be July 9, 1 h. 40 m. 14 sec. 24 th. Thus the dates of the ist, the viith, the xvth, and the xxiid mansions, and those

† Locis cit.

These coincidences could not be the effect of accident. The names of Mao, Sing, Fang, and Hiu, must have been purposely attached to the particular Egyptian mansions of type iii, to which they respectively agreed in that type, because those mansions still represented the principal or leading divisions of the mansions in the first type; the mansions which fell in that at the beginning of each of the quarters, and of each of the four seasons, of the natural year. It was easy after that to attach the name of Yao to this first type; or to carry back the type itself to what was pretended to be his time. And yet had these mansions been truly of the supposed time of Yao, B. C. 2357, it is impossible that they could have been found attached to such dates of the equinoxes and solstices as these of April 8, July 9, October 8, and January 7 respectively; each of which, B. C. 2357, must have been three or four days at least in defect of the truth.

It is however remarkable that they set back the first type of the mansion to the time of Yao; and the time of Yao himself to a date almost the same as the Scriptural date of the deluge. It is very probable that they knew the true date of the mansions to have come within 500 years of the deluge; the fact of which was undoubtedly perpetuated historically or traditionally in their own country; and was connected too with the time of Yao [u]. Yao was the greatest of their kings; the pattern and type of what their kings were expected to be in all respects: and some modern chronologers have supposed he might possibly have been even the patriarch Noah. It was a very easy thing at least, and one about which the Chinese would have little scruple, to set back the mansions one period of 500 years even before the epoch of the Phœnix period itself; and so to the time of Yao: and then to attribute the scheme and delineation of type i of the mansions itself (a scheme in their representation of it supposed to be perpetual) to this emperor too. Be this as it

of Mao, Sing, Fang, and Hiu, and those of the mean V. E. the mean S. S. the mean A. E. and the mean W. S. and these four Julian terms, April 8, July 9, October 8, and January 7, for the meridian of Pekin in China, B. C. 1847, were absolutely the same.

[u] Gaubil, Traité, 15, 16: 17, 18. Lettres Édifiantes, xxvi. 84. Cf. Martinius, i. Imp. vii. 39.

may, no reasonable person can doubt that their tradition respecting Yao, and the four mansions or constellations, Mao, Sing, Fang, and Hiu, and the four divisions of the natural year, is to be explained and verified, if at all, by these Egyptian types of the mansions, the first and the third; and therefore that this very tradition, relating to the Chinese scheme of the mansions, is one of the most decisive arguments of the derivation of these mansions themselves from the Egyptian.

iv. It is proper here also to remind the reader of the testimony produced on a former occasion [w] to the Chinese tradition relating to the supposed epoch of the beginning of the motion of the earth; that is, of time itself, as measured either by the motion of the earth around itself, or by its motion around the sun, or by both: for this movement of the earth must mean one of these two things, or both. Now this motion was said to have begun in *Pi* and *Mao*. These are both names of mansions. Mao, as we have seen, is the Chinese name for the first mansion of the Egyptian type of B. C. 1847, and Pi is the Chinese name of the second. The Julian date of Mao in type i was April 8; that of Pi was April 21: the Julian date of Mao in type iii was April 14 = 13; that of Pi was April 27 = 26. A motion, which began in Pi and Mao, must have begun critically between the two. Consequently, if referred to type i, it must have begun between April 20 and 21: if referred to type iii, between April 25 and 26. Either of these would be true of the beginning of things; more especially the latter, April 25 or 26. We look upon this tradition as a very striking confirmation of the primitive and universal belief of the actual commencement of time in conjunction with the present system of things, at the same season of the year, and almost on the very same day, which is assigned it by Scripture itself.

v. We have already explained, in like manner [x], that the distinction of the two spheres, the immoveable or sphere of Mazzaroth, and the moveable or tropical sphere, was known to the Chinese: i. e. it passed from the Egyptians to the

[w] Diss. ix. ch. iv. sect. vii. vol. ii. 94. [x] Diss. ix. ch. iv. sect. vii. vol. ii. 93.

Chinese as it did to other nations of antiquity besides. We have shewn that their famous term of the xvth of Aquarius was taken directly from this sphere of Mazzaroth, and was always attached to the Julian date of that same degree in that sphere, February 5 before B. C. 672, and February 4, after it. It is observable that their mansion Che itself is the nearest to that term of all the mansions; and in each of the types of the mansions also, from the first to the third. In the first the date of this mansion is Feb. 2; in the second Feb. 5; in the third, Feb. 8=7. There cannot be any doubt that this relation of Che to the middle term of Aquarius in the sphere of Mazzaroth had much to do with their choice of this, as the head of the lunar mansions, properly so called, the mansions called *Che*; i. e. houses, hotels, or lodgings of the moon. We have seen too[x] that this was the mansion, and this the constellation, in which they sought to place their famous conjunction of the five planets[y], on purpose to render it the more illustrious.

It is not necessary to suppose that the distinction of spheres in question first became known to the Chinese in B. C. 658—657; when they adopted the mansions and corrected their calendar. But we should be entirely of opinion that the cardinal points in the natural year were laid down by them at this time agreeably to this destinction, as it held good in the last combination of the two spheres, B. C. 848, when the tropical points were left attached to the eighth degrees of the sphere of Mazzaroth. Only as the epoch of the sphere of Mazzaroth itself, after B. C. 672, would be found to have dropt from March 24 to March 23 at noon; the mean vernal equinox, in that sphere, after B. C. 672 would be found attached to March 30, not to March 31; the mean summer solstice to June 30; the mean autumnal equinox to September 29, and the mean winter solstice to Dec. 29.

Now Gaubil, without the advantage of the facts, which we are here employed in pointing out, to guide and assist him in any such researches, had nevertheless discovered, from data of a totally different kind[z], that March 30 must have been

[x] Diss. ix. ch. iv. sect. vii. vol. ii. 92. [y] Cf. Lettres Édifiantes, xxvi. 265–266.
[z] Traité, 230—232.

the fixed date of the vernal equinox, among the Chinese, or some date not later than that; and one of these three, Dec. 27, 28, or 29, that of the winter solstice: and as he himself was inclined to conclude, Dec. 29, which would consequently fix the vernal equinox (91 days later) to March 30. These notices are attached by the Chinese themselves to dates which go back as far as B. C. 1068[a]: but that proves only the more clearly that they were purposely carried back from a later to an earlier period: for in B. C. 1068 neither would March 30 have been a correct date for the mean vernal equinox, nor Dec. 29 for the mean winter solstice; not even in the sphere of Mazzaroth, much less in the natural; as any one may see from our own Tables of that date.

The Egyptian mansions in the type of B. C. 848 having all been set back 13 days, so that the xxviiith of type i became thenceforward the ist of type iii, and so on; if we may suppose the Chinese names of the mansions to have accompanied them from the first, and a similar change to have been made in them too at the epoch of type iii; it is manifest that, before and after this date of B. C. 848 respectively, the principal mansions under their Chinese names would stand as follows:

Equinoctial and Solstitial mansions under their Chinese names.

Type i. B. C. 1847.			Type iii. B. C. 848 = 672.		
Vernal Eq.	Mao	April 8.	Vernal Eq.	Ouey	March 31.
Summer Solst.	Sing	July 9.	Summer Solst.	Lieou	June 30.
Autumnal Eq.	Fang	Octob. 8.	Autumnal Eq.	Ti	Sept. 30.
Winter Solst.	Hiu	Jan. 7.	Winter Solst.	Nu	Dec. 30.

These dates in type iii differ very slightly from those which Gaubil was led to fix upon. According to the Chinese rule however, each quarter of the natural year being reckoned at 91 days, 7 hours, 30 minutes, then the primary or principal date of all, that of the mean vernal equinox, being taken at this time directly from the sphere of Mazzaroth, all the rest would be cyclically reckoned and found as follows:

a Ibid. 232.

Equinoctial and Solstitial mansions,
Type iii. B. C. 848–657. *Equinoxes and Solstices.*

						Midnight.
Vernal mansion	Ouey	March 31.	Vernal Eq.	March	30.	0 0
Summer mansion	Lieou	June 30.	Summer Sol.	June	29.	7 30
Autumnal man.	Ti	Sept. 30.	Autumn. Eq.	Sept.	28.	15 0
Winter mansion	Nu	Dec. 30.	Winter Sol.	Dec.	28.	22 30*

vi. The annals of the Chinese make mention of an observation of the summer solstice by a celebrated astronomer of their own nation, *Tcheou-Kong*, brother of the reigning king Vou-Vang or Ou-Ouang[b], whose reign according to Gaubil goes back to B. C. 1122[b]. M. Biot has considered the circumstances of this observation, and concluded that it must have been made in B. C. 1100[c]. The Chinese record also an observation of the winter solstice[b] by the same astronomer, and in the same year, and at the same place[d]; by which it was found that the right ascension of the solstitial point (270°) was just two Chinese degrees greater than that of the constellation Nu: and two Chinese degrees being just equal to 1° 58′ 17″ of ours[e], this supposes the right ascension of Nu at the time of the observation to have been 270°—1° 58′ 17″ or 268° 1′ 43″. And this M. Biot[e] reduced to the test of calculation, assuming only that the right ascension of Nu was that of ε Aquarii[ee]; and found it to be merely 49′ 33″ in defect of the truth, 268° 51′ 16″.

We know of no sufficient reason for calling in question the first of these observations, attributed to Tcheou-Kong, that of the summer solstice; but the fact of the second, in our opinion, *is* questionable; more particularly because of the connection which it supposes between the winter solstice and

* The mean vernal equinox for the meridian of our Tables, B. C. 657, being assumed at March 29, 19 h. 27 m. 28 s. 48 th. instead of March 27 at the same time, then for the meridian of Pekin, we have as follows:

	h.	m.	sec.	th.
Mean vernal equinox March 30.	0	52	37	48
Mean summer solstice June 29.	8	19	50	24
Mean autumnal equinox Sept. 28.	15	47	3	0
Mean winter solstice Decem. 28.	23	14	15	36

b Gaubil, Traité, 34–36: 230–232. Lettres Édifiantes, xxvi. 124, 125–127: note, p. 125. 188.

c Traité Élémentaire, iv. §. 421–424: 614–621.

d Ibid. § 422–424: 618–621.

e Lettres Édifiantes, xxvi. p. 79 note. Biot, loc. cit.: §422. p. 618: also i. § 56. p. 69: iv. § 73. 110.

ee Cf. Lettres Édifiantes, xxvi. 125. note 1.

the mansion Nu, B. C. 1122–1100: a point of time which falls in the middle of the second type of the mansions, B. C. 1347–848: and we are inclined to believe that this determination of the winter solstice B. C. 1100 was obtained by calculating back from B. C. 657.

Gaubil observes on this point [e]: "Dans l'astronomie des *Han* orientaux on voit une disposition des signes, où le second degré de la constellation *Nu* est le premier degré de notre signe *Caper:* on dit que cette disposition est de *Tcheou-Kong,* frère de *Vouvang;* et on ajoute que *Tcheou-Kong* fixa le solstice d'hiver au deuxième degré de la constellation *Nu.* L'auteur du livre *Tien-Yuen-li-li,* dont j'ai parlé dans la deuxième partie, suppose que cette fixation du solstice au second degré de *Nu* du temps de *Tcheou-Kong* est certaine; en conséquence de ce qui est dit dans le livre *Tcheou,* trouvé avec la chronologie du *Tchou-chou.*"

The constellation Nu is that one of the Chinese constellations or mansions which has always preserved the closest agreement to the xxi mansion in our original list. Its longitude according to Gaubil, A. D. 1700, was

	307° 34′ 30″
In our own type iv at the same date the longitude of the xxi mansion was ..	306 27 41
	1 6 49

Now from B. C. 657 to B. C. 1100 (that being supposed the date of the summer solstitial observation of *Tcheou-Kong*) the interval was 443 years; in which time precession would amount to 6° 9′ 40″·807. From B. C. 847 to B. C. 657 the interval was 190 years = 2° 38′ 33″·213. Hence

Mean longitude of mansion xxi, at the mean V. E.	B. C. 847	271°	3′	3″·827
	— 190	+ 2	38	33 ·213
Mean longitude, mean V. E. ..	B. C. 657	273	41	37 ·040
	+ 443	— 6	9	3 ·246
Mean longitude of mansion xxi at the mean winter solstice	B. C. 1100	267	32	33 ·794
R. A. of winter solstice		270	0	0
R. A. of mansion xxi		267	32	34
		2	27	26

We thus see how easy it would be, on this principle, to determine the winter solstice B. C. 1100 to the second degree

e Traité, p. 230.

of the xxist mansion = the Chinese Nu. The Chinese made the longitude of Nu

	268°	1′	43″
We have made it ..	267	32	34
		29	9

We have however dwelt sufficiently long on these points. We think that there cannot now be any reasonable doubt concerning the derivation of the Chinese mansions from the Egyptian; and from the Egyptian of the type of B. C. 848, adopted in China in B. C. 658–657. We conclude with exhibiting the scheme of these mansions, both in the Egyptian type continued down to A. D. 1700, and in the Chinese according to Gaubil [f] as they stood in that year also.

Section VII.—*Comparison of the Egyptian mansions, type iii, and the Chinese, both as they stood* A. D. 1700.

EGYPTIAN, type iii, A.D. 1700.				CHINESE, A. D. 1700.[g]							
B. C. 847.				Chinese names.	Longitudes.			Degrees on the equator.	Latitudes.		
L. of	Deg.	min.	sec.								
Man. xii	155	20	12·398 135								
Precession	35	24	37·051 386		Deg.	min.	sec.		Deg.	min.	sec.
i	190	44	49·449 521	Kio	199	40	3	12	2	1	49 S
ii	203	36	15·163 806	Kang	210	19	41	9	2	55	58 N
iii	216	27	40.878 091	Ti	220	54	28	15	0	21	52 N
iv	229	19	6·592 376	Fang	238	44	58	5	5	26	42 S
v	242	10	32·306 661	Sin	243	35	48	5	3	58	10 S
vi	255	1	58·020 946	Ouey	251	5	0	18	14	50	0 S
vii	267	53	23·735 231	Ki	267	4	18	11	6	56	37 S
viii	280	44	49·449 516	Teou	275	59	48	26	3	54	23 S
ix	293	36	15·163 801	Nieou	299	51	48	8	4	37	2 N
x	306	27	40.878 086	Nu	307	34	30	12	8	10	15 N
xi	319	19	6·592 371	Hiu	319	13	17	10	8	38	20 N
xii	332	10	32·306 656	Ouey	329	11	13	17	10	39	40 N
xiii	345	1	58·020 941	Che	349	17	3	16	19	24	58 N
xiv	357	53	23·735 226	Pi	4	57	13	9	12	36	30 N
xv	10	44	49·449 511	Kouey	16	31	0	16	17	48	20 N
xvi	23	36	15·163 796	Leou	29	46	13	12	8	38	35 N
xvii	36	27	40·878 081	Ouey	42	47	36	14	11	8	29 N
xviii	49	19	6·592 366	Mao	55	47	8	11	4	1	13 N
xix	62	10	32·306 651	Pi	64	14	59	16	2	36	21 S
xx	75	1	58·020 936	Tse	79	35	30	2	13	25	40 S
xxi	87	53	23·735 221	Tsan	78	9	43	9	23	36	0 S
xxii	100	44	49·449 506	Tsing	91	4	50	33	0	53	30 S
xxiii	113	36	15·163 791	Kouey	121	31	51	4	0	48	8 S
xxiv	126	27	40·878 076	Lieou	126	7	30	15	12	27	0 S
xxv	139	19	6·592 361	Sing	143	6	23	7	22	25	20 S
xxvi	152	10	32·306 646	Tchang	151	30	0	18	26	12	0 S
xxvii	165	1	58·020 931	Y	169	33	0	18	22	41	0 S
xxviii	177	53	23·735 216	Tchin	186	35	0	17	14	25	0 S

f Traité, p. vi. Cf. Lettres Édifiantes, xxvi. 288, 289. Martinius, Historia Sinica, ii. p. 51. Yuus. Ideler, Chinese Calendar, ch. iii. p. 100.

g Cf. Delambre, Astron. Ancienne, tome i. p. 380. Liv. ii. ch. i. The lists in the Traité and that in the Lettres Éd. do not agree throughout, particularly in the order of the mansions Tse and Tsan. We follow the former.

CHAPTER XII.

On the Hindu mansions, and on their derivation from the Egyptian.

SECTION I.—*Brief history of the corrections of the Hindu calendar.*

IT has been already explained that the earliest correction of the primitive calendar among the Hindus of antiquity was made A. M. 2699, B. C. 1306, æra cyc. 2701 : and that the first idea of this correction must have been derived from the Egyptian, (if correction that could be called,) which took place in Egypt in B. C. 1350 æra cyc. 2657, along with the introduction of the worship of Osiris and Isis; the proof of this connection between the Egyptian correction of earlier and the Hindu one of later date being supplied by the fact that the Hindu correction was attached to the 17th of the primitive Athyr æra cyc. 2701, as the Egyptian had been to the 17th of the same month æra cyc. 2657; and that the Indian correction was associated from that time forward with the worship of Deunūs and Durgā, as the Egyptian was with that of Osiris and Isis; and that the Indian Deunūs and Durgā were absolutely the same kind of conceptions and impersonations in India as Osiris and Isis in Egypt.

The 17th Athyr, æra cyc. 2701, dated from midnight, corresponded to Sept. 25, A. M. 2699 B. C. 1306, dated from midnight also. This term is the true Julian date of the first correction of the primitive calendar among the Hindus of antiquity, of which any actual proof is in existence; Sept. 25, in the first year of the cycle of leap-year, Sept. 24 in the common years. There is no earlier correction than this of which any thing is known. The Hindus themselves carry back the epoch of their lunar mansions to that of the æra of Paraśurāma; or to a point of time very near it, which Mr. Bentley [h] determines to B. C. 1182, five years earlier than the reputed commencement of the æra, B. C. 1177; or to B. C. 1193, sixteen years earlier. It is easy to explain on what principle this was done. The next change really made in their calendar took place

h Hindu Astronomy, sect. i. p. 6–3.

B. C. 946. The period of 247 years was connected with that change. They set back the true date of the change therefore, for particular reasons, one period of this kind, from B.C. 946 to B. C. 1193; very nearly to the beginning of the æra of Parasurāma, perhaps, if the truth were known, to the actual beginning of that æra itself.

This first Hindu correction of the primitive calendar was Julian in principle, and cyclico-Julian in the application. The calendar consequently continued cyclical in appearance after it as much as before. It was allowed to fall back on its fixed Julian term of origination Sept. 25–24, for one equable month of 30 days; that is, to August 26: but when it had reached that extreme limit, a month of 30 days was intercalated, or the last month of the calendar was repeated: and thus it was brought back again to its original epoch, Sep. 26. In the cyclico-Julian calendars of antiquity this effect, as we have explained, took place regularly in the cyclico-Julian period of 120 years.

Now this Hindu calendar, once corrected and on this principle, appears to have been administered in the strictest conformity to the principles of the correction itself, for three of these periods of 120 years, 360 years in all; i. e. from Sept. 25 B. C. 1306 to Sept. 25 B. C. 946. In the original correction of the calendar, B. C. 1306, we do not discover any intentional reference to the moon: none at least to the luna prima, or to the luna quintadecima, that is, to the conjunction, or to the full. The calendar was purely solar before it; and it continued to be purely solar after it. Whether the natural lunar cycle of the primitive solar calendar, the Apis cycle, was known to or possessed by the Indians of old, we cannot undertake to say. No proof of that fact has yet fallen in our own way; but that is no disproof of the fact itself: nor is it impossible that actual proofs of the fact may yet come to light. Be this as it may, with respect to the lunar character of Sept. 25 B. C. 1306, the 17th of the primitive Athyr æra cyc. 2701; every solar term must necessarily coincide with some lunar term for the time being: nor can any coincidence of that kind, strictly speaking, be considered accidental, and not the necessary effect of the relation of true solar to true lunar time from the

first. This year, B. C. 1306, in our general lunar calendar is seen to correspond to period ix. cycle xv. 1; the principal or primary new moon of which was April 21 at 18 hours, or April 22 at midnight: and the moons being reckoned alternately 30 and 29 not 29 and 30 days long, beginning with April 22 at midnight, the sixth moon that year would be found to fall Sept. 17 at midnight; and consequently the 9th day of that moon Sept. 25 at midnight.

On this principle, the epoch of the first Hindu correction of the primitive calendar, Sept. 25 B. C. 1306, was falling on the *luna nona*: and if the calendar had become lunar at that time, and had nevertheless been attached to the same Julian date, Sept. 25, its proper lunar epoch must have been the lunar ninth. We shall see the importance of this coincidence by and by. Another remarkable circumstance is that this year B. C. 1306, the date of the first correction of the primitive calendar among the Hindus, was the first year of one of the Metonic cycles of our general lunar calendar, brought down to that point of time from the first. It was the first year of the 143d cycle of 19 years from B. C. 4004. Consequently, if the Hindu calendar had become lunar at this time, and subject to the Metonic cycle from this time forward, as it afterwards became, no calendar of antiquity would have possessed a more genuine and authentic cycle of that kind than the Hindu.

It is here proper to observe that, according to the astronomical rule of reckoning the æra before and after Christ[h], B. C. 945 answers to B. C. 946: and as Mr. Bentley, in his work on Indian or Hindu astronomy, from which we have derived the greatest assistance in this part of our subject, follows the astronomical not the chronological rule, it will be understood that B. C. 945 in his style of the æra vulgaris is the same as B. C. 946 in ours. Now this year, B. C. 946, as we have observed, was the date of the fourth cyclico-Julian period of 120 years in the Hindu correction of B. C. 1306: down to which time, as we have also observed, the calendar was administered in conformity to its cyclico-Julian principle. But as it became lunar in this year, and from this time forward, it is proper that we should stop to inquire into

[h] See the Introduction to our Tables, part i. ch. iii. sect. ii.

the lunar characters of this year in particular; and into their relation to those of the epoch of the original correction, B. C. 1306.

This year B. C. 946 then, as our general lunar calendar shews, was the last year of the first Metonic cycle of our xith Hipparchean period of 304 years: in which the principal new moon of our lunar calendar of type i was bearing date April 1 at 18 hours, and that of our lunar calendar of type ii, on March 31 at 18 hours. In the last year of one of our Metonic cycles the calendar dates are necessarily 24 hours in excess of the true mean lunar dates: but even in the last year of the *first* such cycle of one of our periods of 304 years, they cannot be more. It may be assumed then that the true calendar date of the true mean new noon, for the month of April, B. C. 946, would be March 31 at 18 hours, or April 1 at midnight: from which it would follow that the true calendar date of the viith new moon, the new moon of September, would be Sept. 24 at 18 hours, or Sept. 25 at midnight. That is, in this particular year, B. C. 946, and at the epoch of the fourth cyclico-Julian period of 120 years, and of the fourth cyclico-Julian correction of the Hindu calendar, the proper solar and Julian epoch of the calendar, whether Sept. 24 at 18 hours, or Sept. 25 at midnight, was coinciding critically with the *luna prima*.

There cannot be any question about the date of the mean new moon in September this year for the meridian of our tables, which is that of the ancient Jerusalem; and some time between 18 hours and midnight would be its date for any meridian which could be assumed in India. Mr. Bentley frequently assumes the meridian of Ujein (in long. 75° 50′ east of Greenwich, and 23° 11′ N. lat.[i]) 4h. 54m. east of Paris, as he supposes, and therefore 2h. 43m. east of Jerusalem; as if that was the most proper to be fixed upon for this remote period of time: which perhaps may very well be considered a doubtful point. No meridian however, as we have observed, could be any where assumed in India, which would differ by much more than three hours east from that of our tables.

It appears from Pingré, that there was a solar eclipse B. C. 946, October 24, at 7.15 P. M. for the meridian of Paris:

[i] Cf. part ii. sect. i. p. 87. 111: iv. 162.

which Mr. Bentley determines to October 25[k]; though it does not appear that he proposes any formal calculation of it: and yet an eclipse, October 24 at 7.15 P. M. for the meridian of Paris, might bear date Oct. 25 at 0h. 9 m. for that of Ujein in India. But Mr. Bentley himself has connected this eclipse with the Hindu tradition relating to the birth of the Hindu goddess Srī, whom they represented as the offspring of the sea, like the Aphrodite of the Greeks; and whom Mr. Bentley considers to be the type of the lunæsolar year of the Hindus[l]: in which case the supposed date of her birth could coincide with nothing so properly as the date of the lunæsolar correction of their calendar itself.

Now the modern Hindu calendar dates the birth of this goddess on the 30th lunar day of *Ās'wĭna*[m]: and supposing the first of Ās'wĭna to be Sept. 25, the 30th day would be Oct. 24. Moreover this goddess had also the name of *Lakshmī*[m]; the reason of which was because she was born on the *feria quinta* or Thursday: from which coincidence too this *feria quinta* of the hebdomadal cycle, in the corresponding cycle of the Hindus, derived its peculiar name of Lakshmī-wār or Lakshmi's day. Mr. Bentley has mentioned this tradition, and made use of it to illustrate his date of the eclipse B. C. 946: but he does not seem to have inquired whether Oct. 25 B. C. 946, agreeably to the tradition, was the *feria quinta* or not. In the common solar cycle of chronology carried back to B. C. 946, the Dominical Letter of that year is found to be B; and therefore Oct. 25 to be the *feria tertia* or Tuesday. But in the true solar cycle of the same year, which is that of our Fasti, the Dominical Letter is F: and therefore Oct. 24 was the *feria quinta* or Thursday. And this being also the lunar 30th reckoned from Sept. 25, these two coincidences confirm each other. The reputed birth of Srī, (the impersonation of the lunæsolar calendar,) on the *feria quinta* and on the 30th of Ās'wĭni, both meeting in Oct. 24 B. C. 946, and the first introduction of the lunar calendar itself among the Hindus, would virtually be the same thing. The true date of this lunar correction would thus be determined by this very tradition to B. C. 946, and not as Mr. Bentley supposes to B. C. 1193[n]; and it is an obvious inference from it also,

[k] Part i. sect. ii. 28–30. [l] Ibid. 22. 27. [m] Ibid. 27. [n] Ibid. 34.

that the hebdomadal cycle, in its proper and legitimate form, must have been known to the Hindus and in use among them, as far back as B.C. 946 at least.

This year then, B. C. 946, being the date of the fourth cyclico-Julian period of 120 years proper to the Hindu correction of the primitive calendar, and the third correction of the Hindu calendar, on the cyclico-Julian principle, having just been administered to it, and the head of the calendar thereby having been brought back to its normal position, coincident with Sept. 25, exactly as it stood B. C. 1306; it was further discoverable at this time that this proper Julian date, Sept. 25, was falling on the luna prima: and consequently that, September 25 being assumed as the *luna prima*, the *luna septima* must fall on October 1.

Here then we must remind the reader of the fact which we began with pointing out; viz. that the true lunar character of the epoch of the first Hindu correction, B. C. 1306, was the *luna nona*. Whether this fact be supposed to have been perpetuated by tradition down to B. C. 946, or to have been ascertained by calculation carried back from that year; the inference from it would be the same; viz. that the proper lunar epoch of the calendar from the first being the luna nona, the proper lunar epoch of any observance, which had been attached to the head of the calendar from the first, would seem to be the luna nona too.

Now though the Hindu festival of Durgā, the oldest and most solemn, as well as the most superb and magnificent, of all their festivals, was really attached at its first institution to September 25, the head of the cyclico-Julian correction; yet it appears from Mr. Bentley[o], according to the accounts of the Hindus themselves, that it was instituted upon and attached to the ninth day of the moon; and it was celebrated from the first on the ninth day of the moon. What we have just pointed out, viz. that Sept. 25 itself, B. C. 1306, coincided with the ninth day of the moon, is sufficient to prove that there was an historical foundation for this tradition; though as simply so stated it is not altogether in conformity to the truth. It is not less certain that the rule at present is to begin the celebration on the luna septima; and that it

o Part i. sect. i. 12, 13.

has been so ever since B. C. 946. But as Mr. Bentley also shews°, though it begins on the 7th, it lasts to the 9th: so that in reality, as he justly observes, it is equally true, even of the practice at present, to say that the festival is attached to the 9th luna, and that it is so to the 7th.

We are now in a condition to explain this fact; the only one which was calculated *a priori* to occasion any difficulty in tracing the transition from the first correction of the Hindu calendar to the second, and from the cyclico-Julian form of the calendar to the lunæsolar; which took place in this year, B. C. 946. It has been seen that the proper lunar character of the first cyclico-Julian correction, Sept. 25 B.C. 1306, was the luna nona; and the proper lunar character of the fourth, September 25 B. C. 946, was the luna prima. Sept. 25 being the *luna prima,* the *luna nona* would be October 3. The proper lunar epoch of the correction on this principle would seem to have been October 3; and yet in reality it was October 1. The head of the lunar calendar was attached to October 1, not to October 3; that is to the *luna septima* not to the *luna nona.* But there was a reason for fixing on October 1, and consequently on the *luna septima;* which will appear as we proceed. The head of the lunar correction therefore, and with it the beginning of the festival of Durgā, was fixed to October 1, and to the *luna septima;* but the festival was appointed to last until the *luna nona:* which was virtually to recognise the *luna nona* as the proper *lunar* epoch of the correction also. And this rule of the festival of Durgā, that it should begin on the seventh of the proper lunar month, (which has never been any but the lunar Ās'wīna,) and last to the ninth, thus instituted at the epoch of the lunar correction B. C. 946, has continued in force ever since*.

* The lunar calendar of the Hindus may be seen in sir William Jones' works, vol. iv. p. 132—165, "Essay on the lunar year of the Hindoos."

In this (p. 132) the first lunar month is Ās'wīna. The festival of Durgā is marked as beginning on the *sixth* of the first *fifteen* days of this month (every Hindu lunar month consists of two such periods of fifteen days) and as ending on the *ninth* inclusive. There is a note of the commentary (Bha-wish-yóttara,) on the first day, to this effect:

"By some the *first nine* nights are allotted to the decoration of Durgā with ceremonies peculiar to each:" a very plain intimation, in our opinion,

° Part i. sect. i. 12, 13.

Such is the true history in brief of the Hindu calendar, and of its different transitions, first from the primitive cyclical to the cyclico-Julian, B. C. 1306; and secondly, from the cyclico-Julian to the lunar at present in use, B. C. 946; and why it began with being attached to September 25, and ended in being attached to October 1. This account indeed differs from Mr. Bentley's. But he was misled by the statements of the Hindus themselves; who have totally kept out of sight their purely cyclical or equable calendar, older than B. C. 1306, and their cyclico-Julian not older than B. C. 1306, but much older than B. C. 946; and have purposely carried back this lunæsolar calendar of B. C. 946, and its peculiar rule, 247 years at least beyond its true date; that is, to B. C. 1193 instead of B. C. 946[p]: though they cer-

that the festival really began originally on the ninth day of the lunar month, and that the night-day of the Hindus at first, like that of every other people of antiquity, was reckoned from evening or sunset, not from morning or sunrise.

It is a curious coincidence also, that on the ninth day of the last fifteen days of the month before Ās'wīna, Bhádra, the last lunar month of the calendar, (p. 163, 164) on the day marked in the calendar Bódhanam, we find the following note from the Cálicá purána.

" Some begin on this day and continue till the ninth of the new moon the great festival called *DurgotSava,* in honour of Durgá, the goddess of nature, who is now awakened with sports and music, as she was waked in the beginning by Brahmá during the night of the gods."

Each of the lunar months of the Hindus nominally contains 30 days, and so far resembles a solar month as much as a lunar. And this peculiarity of their lunar month is a strong internal evidence that it was originally derived from the primitive equable month of 30 days itself. When the cyclico-Julian calendar was instituted in B. C. 1306, and when it passed into the lunar B. C. 946, Bhádra, the last month, would bear date August 26, Ās'wīna the first, September 25; and Bódhanam, the 24th of Bhadra, would correspond to September 18; and Sept. 18, though not the actual date of the new moon, B. C. 1306, was seven days complete before September 25, the first of Ās'wīna. Those therefore, who observed this custom of beginning the feast of Durgā seven days before the new moon, yet keeping it up to the ninth of the new moon, i. e. *sixteen* days in all; may be supposed to have done so on the assumption that the proper and legitimate date of the feast was September 18, seven days before September 25, and its proper and legitimate termination was October 3, 15 days after September 18, eight days after September 25. And this might have held good, even B. C. 1306, in the solar calendar; much more B. C. 946, in the lunar, when September 25 was actually the *luna prima.*

p Hindu Astronomy, part i. sect. ii. 12, 13.

tainly appear to have stopped there, without venturing to go back another period of 247 years, i. e. to B. C. 1440; which would have taken them beyond the date of the time when the first change of any kind at all was actually made in their calendar. From which fact, we think, it may reasonably be inferred that they were aware of the truth on this point; viz. that the first actual correction of their calendar was not older than B. C. 1440, though it might be than B.C. 1193.

SECTION II.—*On the discovery of the Metonic cycle by the Hindus between* B. C. 1306 *and* B. C. 946.

To judge from the nature of the correction which the Hindus applied to their calendar on this second occasion, we must necessarily come to the conclusion that between B. C. 1306 and B. C. 946 they had either discovered the Metonic cycle for themselves, or had become acquainted with it from some other quarter. The correction which they actually applied to their calendar in this very year, and which converted it at once from solar into lunæsolar, embodied this cycle; and in a very unquestionable form.

The Metonic cycle indeed at first sight does not appear to be one of those profound and mysterious secrets of nature, which mankind could not be supposed likely to discover until after ages of research and investigation. In the opinion of Delambre, nothing was more obvious, nothing was more probable, than such a discovery; and, as he remarks in his History of Ancient Astronomy, men had only to watch and to observe the heavens with sufficient care and attention, to make this discovery every where. And yet the most obvious things are not always the first to be discovered; and it may well be doubted whether the fact has actually been *any where,* as this mode of representing it would imply that it might have been, and even that it must have been. Men have been employed in watching the heavens ever since they had eyes with which to watch and observe any thing; and they have watched and observed no object in the heavens more narrowly, more assiduously, and with more interest and curiosity every where, than the moon: and yet they have not made the discovery of the Metonic cycle every where.

On the contrary, we venture to say there is no proof, in the whole history of time from first to last, of the actual knowledge of this cycle among any nation, of which it can be predicated with certainty that the knowledge so existing at a given time, and so possessed by that particular part of mankind, was attained to of and by themselves; without any light but their own observations, and any assistance but their own researches.

We do not discover this cycle among the Egyptians; though we find almost every thing else of the same kind in Egypt in one shape or other: or if we do find it among them, (of which more, we hope, hereafter,) it is at a time when it could not on any principle be regarded as an original discovery of theirs. We cannot assume that the Chinese, the Japanese, the Siamese, discovered this cycle for themselves; if their neighbours the Hindus had been in possession of it some centuries before any of them were. We cannot assume that even Meton, among the Greeks, discovered this cycle for himself; if it was known and in use in so many parts of the ancient world with which the Greeks had intercourse even in his time, or might have had before his time. We could not assume that the ancient Swedes, or any other of the nations of the north, or the Abyssinians, or the Peruvians, certainly invented this cycle for themselves; if it first made its appearance among them at a period in the history of the world when the cycle itself was so old and of such long standing in one quarter or other.

In short, there is no proof either of the knowledge of this cycle in theory, or of its application in practice as an actual measure of civil time, before the date of the Eisodus into Canaan; and the first institution, or first introduction into use, of the lunar calendar of the Jews, which was nine years later, B. C. 1511. And though that calendar was regulated by the Metonic cycle from the first, we have no authority for saying that this had been previously discovered by the people of Israel, or by any one person among them, for themselves; and that their calendar is not rather to be regarded as something prescribed by Moses, under the Divine direction, against the proper time when it should be necessary to bring it into use. On this point however every one is at liberty to think as he

pleases. It is not necessary, for us at least, to enter into this question at present.

We have no desire to detract from the merit of the Hindu astronomers, whosoever they were, who lived between B. C. 1306 and B. C. 946; nor to deny them the praise of an original discovery of the Metonic cycle, if it really belongs to them. All that we shall do will be simply to state the matter of fact. i. That this discovery, even though made for themselves, could not have been made by them between B. C. 1306 and B. C. 1066, the date of the third cyclico-Julian period of their calendar; or else, that it must have been applied to the correction of their calendar in B. C. 1066; just in the same manner as it was in B. C. 946. ii. That the next period of 120 years, B. C. 1066 to B. C. 946, embraces the whole of the reigns of David and of Solomon among the Israelites; particularly that of the latter, from B. C. 1015 to B. C. 975. iii. That the calendar of the Israelites at this time, and long before and long after this time, was regulated by the Metonic cycle; and even by the Hipparchean period of 304 years. iv. That there was a constant intercourse between Judæa and India all through the reign of Solomon.

From such facts as these, nothing but the most bigotted and besotted scepticism, nothing but such absurd and irrational prejudice as refuses to draw the simplest and most obvious conclusion from the clearest and plainest premises, if by so doing it must admit the simple historical truth of Scripture; could hesitate to infer that, if the Hindus had never known any thing of the Metonic cycle before the reign of Solomon, and before the beginning of this intercourse with Judæa, it would be in the highest degree probable that they must have become acquainted with it in his reign, and through this channel. For the facts, as we have stated them, in themselves are undeniable: i. That there was a constant communication with India all through the reign of Solomon, that is, for 40 years. ii. That there was a lunar calendar in Judæa, perfect of its kind, yet regulated by the Metonic cycle. iii. That there were curious and inquisitive and scientific men in India at this very time; as the correction of the calendar which they made at last abundantly proves;

men who could not be supposed indifferent to the knowledge of any thing of this kind. The reader may draw his own inference from these premises, whether it is to be considered probable or improbable under such circumstances, that they obtained their first acquaintance with this cycle through the medium of this intercourse; and whether they conceived the idea of applying it to the correction of their own calendar, from what they had learnt of its use in Judæa either from the Jews, or from such of their own countrymen as, among other strangers, had visited Judæa itself in the reign of Solomon.

SECTION III.—*On the nature and details of the second Hindu correction*, B. C. 946.

That the second correction, actually applied to the Hindu calendar in B. C. 946, (but not a moment sooner,) does presuppose a perfect acquaintance with the Metonic cycle, and with the relation of mean lunar time to mean Julian involved in that, no one can doubt, as soon as he is made aware of the nature of the correction itself. Mr. Bentley, in his Ancient Astronomy of the Hindus, has given the best account of that correction; and of the various steps of the process which having been originated in B. C. 946, with a particular object in view, was not finally completed until A. D. 538: and to him we refer our readers for the full and entire explanation of those details. We shall be content, at present, to state the substance of the process in brief.

The Hipparchean period of 304 Julian years is composed of sixteen cycles of nineteen years; and contains 3760 mean synodic lunations; as we have explained at large in the General Introduction to our tables [q]. In the course of one of these periods, true mean lunar time recedes one entire cycle of 24 hours on mean calendar lunar time, or mean Julian solar time; and therefore the calendar or Julian lunar dates of such a period require to be lowered one day at the end of one period, to fit and prepare them to agree to the true mean lunar dates for another period. Whether the Hindu astronomers of B. C. 946 were acquainted with this period of 304 years also, we could not say for certain; but we think it most probable that they were; especially if their knowledge of the Metonic cycle itself was derived from the lunar calen-

[q] Introduction, part i. ch. iii. iv. sect. i–iv: part ii. ch. i. sect. i sqq.

dar of the Jews: for the lunar Metonic calendar of the Jews was regulated by this period. The Hindus have shewn great aptness for altering and modifying, and no doubt in their own opinion improving upon, any thing which they derived at first from others; and so far making even that their own. And as the period of 304 years is easily resolvable into smaller periods, each of them nevertheless comprehending an integral number of cycles of nineteen years, it was evidently capable of being analyzed and remodelled on some other principle.

For example, this period is resolvable into two periods, one of 247 years, and one of 57 years; the former containing 13 cycles of 19 years, the latter three, both together 16. In the former there will be 3055 mean synodic lunations; and though the recession of true mean lunar time on calendar, cyclical or Julian, in 247 years will not amount to 24 hours of mean time complete, it will amount to much more than 12. In fact, that recession in one cycle of 19 years amounting to 1 h. 30 m. of mean time perpetually; in 13 cycles or 247 years it will amount to 19 h. 30 m. of mean time; only 4 h. 30 m. less than 24 hours [r].

Whether the Hindu astronomers fixed upon this period of 247 years, or on that of 304 years, for the proposed regulation of their calendar, in the first instance, may be a doubtful point. It makes little difference indeed to the result, whether they adopted the former, or the latter, at first; for it would still be a certain inference from the event itself that, even if they had proposed to regulate their calendar at first by the period of 304 years, they must have changed their mind before the first period of that kind came to an end, or even was half over; and must have determined to make use of the period of 247 years in its stead: which was virtually the same thing as if they had adopted that period from the first.

We assume then that having conceived the design of converting their calendar from cyclico-Julian into lunæsolar, in this year, B. C. 946, the Hindu astronomers fixed on this period of 247 Julian years, and 13 Metonic cycles of 19 years, by which to regulate it down to a certain time. And though

[r] See the Introduction to the Tables, part iii. ch. i. sect. vii.

the motive which induced them to make choice of this period, whether at first or ultimately, is left to conjecture only, we think it exceedingly probable it was purposely fixed on from some regard to the Phœnix period of 500 years; to which they were probably no strangers even in B.C. 946, and certainly not before the end of one period of 247 years later than B. C. 946. This period of 247 years would enter twice into one Phœnix period of 500 years; besides being a multiple of the Metonic cycle. The Hindu astronomers might possibly think 500 years too long an interval of time for which to use one and the same type of the heavens unchanged: and therefore, in the same spirit of innovation on what they had borrowed from others, under the idea of improving it or of making it their own, they might purposely break the Phœnix period of 500 years into two, of 247 years each.

Here however it is necessary by all means to remind the reader that the distinction of spheres into the moveable or tropical, and the immoveable or sphere of Mazzaroth, of which we have said so much, must have passed to the Indians as well as to others; and must have been eagerly received and adopted by them either before B. C. 946, or at least not later: for it is evident from the history of the peculiar system of administration, which they began to apply to their calendar in this very year, that they made that distinction the ultimate object of this whole administration itself. We have already had occasion to advert to the matter of fact[s] that, having formed the design of attaching the head of their calendar to the nearest term to the proper epoch of the sphere of Mazzaroth, (March 24 before B. C. 672, and March 23 after,) and therefore of raising it gradually from October 1 to March 22, they began to execute that design in this very year, B. C. 946; and steadily persisted in it for 1483 years, until they accomplished their purpose by the last correction, administered to it in A. D. 538: which every one must allow to be the most extraordinary instance of patience and perseverance in the same way, and with a view to the same end at last, in the midst of a thousand impediments, (such as may well be imagined in a country like India,) which the history of the calendar brings to light.

[s] Diss. ix. ch. iv. sect. vi. vol. ii. 85. Diss. xv. ch. iv. sect. x. vol. iii. 314.

The number of days from September 25, the proper Julian epoch of their calendar B. C. 946, and March 24, the proper epoch of the sphere of Mazzaroth at that time, was 180*: and this was not a measure of any number of integral synodic lunations, such as their purpose required. But the head of the calendar being advanced at once, and at this time, partly for this reason and partly for that which has been explained[t], from September 25 to October 1, this number was reduced from 180 to 174; a number much more convenient for the particular distribution which they were proposing to make of it.

They very well knew that in 13 Metonic cycles, or 247 years, true mean lunar time was liable to recede in a certain proportion on calendar or cyclical; and that they must provide for that recession accordingly. It was easy to calculate too that, as this recession would amount to 19 hours 30 min. or thereabouts in 247 years, if the object which they had in view could not be attained in less than six periods of 247 years, they would have to provide for (i.e. to take into account) a recession of $\overline{19\text{h. } 30\text{m.}} \times 6$ in all = 4 days 21 hours.

		d.	h.	m.	sec.
Now six mean lunations of our own standard	=	177	4	24	15
Subtract $\overline{19\text{h. } 30\text{m.}} \times 6 = 117$ h.	=		4	21	
There remain		172	7	24	15

It is manifest therefore, that if they proposed to leave their calendar, at the end of six periods of this description, attached to the same lunar date from which they were setting out, that is, the *luna septima*, they would have to raise it from October 1 to March 22, and to intercalate at different times 172 days in all.

Now this is what they actually did in the manner explained by Mr. Bentley. The calendar went through seven corrections, including that of B. C. 946 itself as the first; beginning on the *luna septima*, October 1 B. C. 946, and ending on the *luna septima*, March 22 A. D. 538. Each of

* In strictness, 181, B. C. 945 being leap-year; but in the Julian leap-year, in the cycle of the leap-year of Mazzaroth, March 24 would be temporarily thrown back to March 23.

t P. 37.

these corrections lasted for 13 Metonic cycles, 247 years. At the end of that period, the head of the calendar was advanced forward, in the regular order of the Julian reckoning from October to March, sometimes 28 days, sometimes 29; but never more than the latter, nor less than the former: and at the same time a new month, in the order of the months in the Hindu calendar, was assumed as the first of the civil year. And thus the calendar was prepared, at the end of one of these periods of 247 years and the beginning of another, for lasting through one such period without any further change. The number and order of the months, alternately 28 or 29 days, actually intercalated in six such periods one after another, will appear from the following synopsis, which we give from Mr. Bentley[u].

Hindu corrections of the calendar, in periods of 247 *years*, 28 *or* 29 *days, from* B. C. 946 *to* A. D. 538.

Period		Intercalated	Julian Epoch	
i	B.C. 946	0 days	Oct. 1	Luna 7[a]
ii	— 699	28 —	— 29	— 7[a]
iii	— 452	29 —	Nov. 27	— 7[a]
iv	— 205	28 —	Dec. 25	— 7[z]
v	A.D. 44	29 —	Jan. 23	— 7[a]
vi	— 291	29 —	Feb. 21	— 7[a]
vii	— 538	29 —	Mar. 22	— 7[a]
		172	= the interval from Oct. 1 to March 22.	

It does not appear that any thing of this kind has been repeated since A. D. 538. Mr. Bentley often asserts that this year is the epoch of an entirely new system of astronomy and of chronology too, now for the first time introduced among the Hindus[v]; and for no other purpose, as it would seem, but that of exaggerating their own antiquity. It is at least, as he shews, the epoch of the invention of that monstrous system of both kinds, which is embodied in the fabulous Hindu period called the Kalpa*. From this time forward too their calendar has been virtually regulated by the

* Kalpa, according to Mr. B. (part ii. sect. i. 84 note) means Form, i. e. Creation; because the epoch of form is that of creation, the epoch when *form* was first given to matter by the act of creation itself.

u Part i. sect. ii. p. 34.

v See Preface, page xiv. Part i. sect. ii. 33, 34. Part i. sect. v. 81, 82. Part ii. sect. i. 83 sqq.

sidereal, rather than by the tropical or Julian, year. From this time also we must date the introduction of their system of sidereal mansions, and of the division of the sphere among those, in contradistinction to the preexisting system of simply lunar mansions; as will be further explained by and by. We cannot doubt therefore that this epoch of March 22, A. D. 538, must have been what they were aiming at all the time, from B. C. 946 forwards, previously. It must have been the object traditionally handed down from one generation of astronomers to another; and religiously observed by each in their turn, for 1483 years: though we should not be justified in saying that every thing which was actually done A. D. 538, by the race of astronomers who were contemporary with the close of the process, was contemplated or designed from the first; or that more was intended by those who originated the process itself, and who first of all handed it over to their successors, than merely to attach the calendar, in due course of time, to the epoch of the sphere of Mazzaroth; and having done that to leave it subject to the sidereal, rather than to the tropical or to the Julian, year.

SECTION IV.—*On the lunar mansions of the Hindus, and on their derivation from the Egyptian. On the Phœnix among the Hindus.*

The sphere of the Hindus, as far as the signs of the ecliptic or zodiac and their names are concerned, is the same as the European or modern; and when we say it is the same with the modern, we virtually say it is the same with the Egyptian, from which the modern itself is derived. The following are the Sanscrit names of the signs at present, and their meanings, according to Mr. Bentley [w].

Sphere or zodiac of the Hindus.

Mesha	=	Aries.	Tula	=	Libra.
Vřisha	=	Taurus.	Vrischika	=	Scorpio.
Mithuna	=	Gemini.	Dhanus	=	Sagittarius.
Karkata	=	Cancer.	Makara	=	Capricornus.
Sinha	=	Leo.	Kumbha	=	Aquarius.
Kanyā	=	Virgo.	Mina	=	Pisces.

[w] Part ii. sect. vi. 202. Cf. Delambre, Astronomie Ancienne, i. Liv. ii. Ch. iii. 446.

Nor is there any reason to suppose that this sphere was ever known among the Hindus without names for the signs, or with any names but these: which being the case, we must conclude that it could not have passed to them from the Egyptians before B. C. 1347, when names were first given to the signs, nor even before B. C. 848, when figures also, in addition to these names, corresponding to them, were first consigned to the zodiac.

With regard to the fable of the Phœnix, and whether it was known to the Hindus of old, the testimonies produced above [x] can leave no doubt of that. In the common belief, and according to the common account of antiquity, the Phœnix was quite as much an Indian bird, as an Egyptian or an Arabian. And it may be inferred from Mr. Bentley that it has not even yet ceased to be naturalized in India. So at least may we collect from his account of Garud'a [y], one of the mythological names applied to the sun; which is explained to mean "the Bird of Vishnu."

Mr. Bentley indeed does not appear to have recognised the Phœnix of antiquity under this name; but to our apprehension the identity of this Garud'a with the Phœnix is clear enough, from the description which he himself has given of it: in particular, its being of the size of an eagle, just as the Phœnix was said to have been by Herodotus; of a beautiful plumage, and its body of a golden colour; another of the characteristics of the Phœnix of Herodotus also: the brother of Aruna, that is, the Dawn, but born after him; the carrier of Vishnu; the destroyer of serpents, and the like: characteristics and attributes, or functions and offices, of this bird, which even as explained by Mr. Bentley would suit just as well to those of the Egyptian Phœnix.

It is curious however to observe how, neither in the account which the Egyptians gave of the Phœnix to the Greeks, nor in that which they passed off to the Hindus or to the Chinese, nor in the figures which they pointed out to the strangers who came among them, as the likeness of the Phœnix, did they suffer the truth to transpire, as it has come to light by means of the representations which modern researches have discovered on the monuments themselves, and

[x] Diss. xv. ch. i. sect. ii. vol. iii. 201. [y] Part i. sect. iii. p. 61, note.

have ascertained to have always been meant for the Phœnix. Yet these accounts are consistent and to the same effect; and therefore one of them helps to authenticate and confirm another, as well as to prove that all were derived from the same source; and that the Egyptians, in the accounts of this mysterious bird which they gave to all strangers alike, were careful to tell the same tale to each, while they told the truth to none.

The sphere then with its characteristic peculiarities, and the fable of the Phœnix also, having thus passed from the Egyptians to the Hindus; it would be nothing extraordinary to find that the lunar mansions too passed from the Egyptians to the Hindus.

Section V.—*On the change made in the lunar mansions of the Egyptians by the Hindus.*

Now though the lunar mansions were not an original conception of the Hindus any more than of the Chinese, and though both received them from the Egyptians, and about the same time; it is very observable, and it illustrates in a striking manner the distinction of character in these two nations, that the Chinese made no change in the mansions, but adopted and retained them just as they received them; merely substituting Chinese names for their Egyptian ones, and revising and laying down, on principles of their own, the constellations or stars connected with each. But in the system of mansions, as a division of the ecliptic or of the equator into 28 equal parts, they made no change whatsoever; neither at first nor afterwards.

The Hindus too received the mansions from the Egyptians in this form of a division of the ecliptic into 28 equal parts; and probably at first did no more than give them Hindu names instead of the Egyptian ones, under which they came to them. It is agreed that they had a system of mansions, 28 in number, older than any thing else of the same kind which has also existed among them. This was the scheme which they first received from the Egyptians; and probably in all respects, except the names, such as they received it. It is certain however that they have also a system of mansions, 27 in number, that is, one less than this; which, not-

withstanding, as it is also agreed, was obtained from this; and therefore must have been of later date than this. It is evident therefore that the Hindus have shewn more of originality and of independence in their mode of using what they had received from the Egyptians, than the Chinese; that the latter were content to adopt and to imitate, the former endeavoured to improve upon, what they learnt from the Egyptians. And though the mansions in no form nor state of their existence among the Hindus could be said to have been properly their own invention, yet the system of 27, founded upon that of 28, must have been a contrivance of their own; and practically amounted to something like an original conception of the same thing by the Hindu astronomers.

If the ecliptic is to be divided into 28 *equal* parts, the length of each must be neither more nor less than 12° 51′ 25″·714. But it may be divided into any number of parts. The length so obtained is subject to the inconvenience of not being an integral number of degrees and minutes: and supposing it only assumed as the fundamental principle of the division, that the length of each part should be the nearest quantity in integral degrees and parts of degrees to the space over which the moon moves regularly in the ecliptic, according to mean motion, in 24 hours of mean solar time; it is evident that a division into 27 equal parts would answer that purpose better than one into 28. For the moon's mean diurnal movement could not be assumed at less than 13° 10′ 35″: and the 27th part of 360° is 13° 20′ exactly, that is only 9′ 25″ more—whereas the 28th part of 360°, or 12° 51′ 26″, would be 19′ 9″ less. The Hindu astronomers therefore determined to adopt this division into 27 equal parts, instead of that into 28; and no doubt principally for this reason: and consequently they assumed the length of each mansion at 13° 20′, instead of 12° 51′ 26″.

It is further to be noticed, on this subject, that the half of one mansion of this standard is 6° 40′, and the fourth part or quarter mansion is 3° 20′ exactly. The Hindu astronomers, having adopted the period of 247 years either before the time when they received the mansions, or along with the mansions, and proposing to apply it regularly to the correction of the calendar, as well as to the revision of the sphere, would have

to consider what the effect of precession on the longitude of each of the mansions would be in each of these periods of 247 years. According to our own table, it would be 3° 26′ 7″·177. But Mr. Bentley repeatedly asserts[z] that the recession in one of these periods, assumed by the Hindus, *de facto* was 3° 20′ exactly. And on this point he appears to have been rightly informed; the history of the mansions themselves among the Hindus from first to last proving nothing so clearly as this fact, that, whether rightly or wrongly in itself, the amount of precession, by which the equinoctial and solstitial points receded upon the ecliptic in each of these periods of theirs of 247 years, was 3° 20′ exactly—which would be at the rate of 48″·582 995 95 annually[a]. This conclusion is of great importance to the further question of the actual date of the reception of the mansions, as modified in this manner, into the Hindu sphere.

SECTION VI.—*On the date of the reception of the Hindu mansions into the Hindu sphere.*

We have already expressed our doubts, whether the idea of the period of 247 years, and of the peculiar rule of the administration of the calendar connected with it, could actually have been conceived and actually applied by the Hindu astronomers so early as B. C. 946; and not rather the period of 304 years, which is the natural period of the Metonic cycle and of the mean Julian year in conjunction. No one however can doubt that whensoever they decided upon the adoption of a division of the ecliptic, like that which has just been described, into 27 equal parts, and on a rate of precession critically accommodated to it, they must have contemplated the regular use and application of this period also. They must have proposed a revision of the sphere every 247 years; and therefore a Phœnix period of their own, only half the length of the Egyptian.

It is a necessary inference from the use of this period at all in connection with the administration of their calendar,

[z] Hindu Astronomy, part ii. sect. i. p. 2. 5. 6. 11. 13: ii. 32. 35.

[a] Mr. Bentley indeed states this more than once at 48″.56661. But he obtained this latter from the division of 3° 20′ by 127 years one month, or $127\frac{1}{12} = 127{\cdot}0833$, and that gives it exactly.

and with its peculiar rule, such as we have already described, that, as so adopted and so applied, it could not be older among the Hindus than B. C. 946. But this is no proof that it might not be younger. Nothing would be easier than to set back such a period to B. C. 946, from any later date which merely stood 247 years, or any multiple of 247 years, distant from it. The conclusion to which we have seen every reason to come on this question, and the proofs of which we shall shortly proceed to lay before our readers, is this: That though the mansions must be supposed to have passed to the Hindus from the Egyptians between B. C. 946 and B. C. 699, they were first introduced into the sphere, as remodelled and reduced to 27 instead of 28, in this year, B. C. 699 itself, which stands at the distance of one period of 247 years from B. C. 946 exactly; and which, if the period of 247 years had actually come into existence and actually been applied to the calendar in B. C. 946, must have been the date of the second period of that kind in the regular order of things. But we have seen reason also to conclude that though actually adopted and incorporated with the sphere only at this time, B. C. 699, they were treated from the first as if they had been adopted and in use, in connection with the sphere, ever since B. C. 946; that is, they were set back 247 years all at once, from B. C. 699, the true epoch of their actual adoption, to B. C. 946, the epoch of the correction of the calendar which made it lunar instead of solar.

We shall therefore proceed to the proof of these two propositions, but as briefly as may be consistent with the demonstration of the truth concerning each: i. That the mansions were introduced into the Hindu sphere at the epoch of the second period of 247 years, (dated from B. C. 946,) viz. B. C. 699. ii. That they were nevertheless set back, and at that very time, to the epoch of the first, as the epoch of their lunæsolar correction also, B. C. 946.

SECTION VII.—*On the proof of the first proposition, that the Hindu mansions were adopted and received into the sphere in* B. C. 699.

This proposition will be sufficiently established, if it can be made to appear that the mansion, called Kṛitikā in the

Hindu scheme, was originally the first in that scheme, whether it is so at present or not: for our General Synopsis and comparison of all these mansions, the Egyptian, the Arabian, the Chinese, and the Indian or Hindu, will shew at one glance that this Indian mansion Křitikā never could have corresponded heretofore, nor does actually correspond at present, to any mansion in the original type of all, but the xxviiith.

Now the xxviiith mansion in the original scheme, B. C. 848, as we have seen, became the ist: and in the third type of the mansions, as regularly derived from the first, the ist mansion answered to the xxviiith, and *vice versa*, the xxviiith of the latter to the ist of the former. It follows that, if the Hindu mansion Křitikā always corresponded to one of these Egyptian mansions, it always corresponded to the other; and if it *properly* corresponded to the xxviiith mansion of type i, it must always have been the xxviiith in its own system; if it *properly* corresponded to the ist mansion in type iii, it must always have been the first in its own system. If Křitikā was always the last in its own order of mansions, and always the same as the last mansion in the Egyptian of type i or type ii, the Hindu mansions might be as old as the Egyptian of type i or type ii. But if Křitikā was always the first in its own scheme, and always the same as the first in the Egyptian of type iii, then the Hindu mansions could not be older than the Egyptian of type iii, i. e. than B. C. 848, at the earliest; and they might not be so old.

Now though Mulā, according to Mr. Bentley[b], is the first mansion at present in the division of 28, and Jyesht'hā in that of 27, this is no necessary proof that Mulā was always the first in the former, or Jyesht'hā always the first in the latter. Mulā, as Mr. Bentley informs us[c], in one of these divisions simply denotes "root," or "origin;" and Jyesht'hā in the other, merely "eldest," or "first;" so that both terms mean much the same thing, and either would be very proper to denote the first of a series of any kind.

It will be seen from our General Synopsis, that this name of Jyesht'hā does not appear upon our list; but instead of that, and in the same place in which it should have come,

b Part i. sect. i. p. 5. c Loc. cit. p. 5.

Indrā. And the original place of this mansion in the division of 28 does actually appear to have been that which is occupied in our list by Indrā, though this list too is taken from Mr. Bentley[c]. Anurādhā, at least is the name of a mansion common to both divisions, both that of 28 and that of 27: and Indrā stands next to Anurādhā in the division of 28, Jyesht'hā in that of 27: and Indrā being assumed to stand in the same place in the one as Jyesht'hā in the other, it is easy to see from the Synopsis that Indrā in the Hindu scheme of 28 mansions corresponded to the xvth in the original Egyptian one of type i or type ii: and the seat of both in the original scheme corresponded to the mean autumnal equinox, or middle of the natural year, and ever after to that season of the year in general; that is, to the season to which the Hindu correction of the calendar was always attached, both that of B. C. 1306 and in particular that of B. C. 946.

Or supposing Indrā past over, and Jyesht'hā in the division of 27 to correspond to Mulā in that of 28; still Mulā is seen to answer to the xvi mansion in the original type: and the longitude of this mansion in type i of the Synopsis is seen to have been 192° 51′ 25″.714; and in type iv, of the epoch of A. D. 1802, to have been 243° 35′ 39″·400. In the fixed or sidereal Hindu type of A. D. 538, as it will appear hereafter, Jyhest'hā was left in longitude 226° 40′: and A. D. 1802 also it was to be found in longitude 244° 14′ 47″·899: that is, almost absolutely the same as mansion xvi of type i, at the same point of time.

It is easy to perceive then that, both Mulā in the division of 28, and Jyesht'hā in that of 27, must have corresponded most properly to the xvth or to the xvith mansion in the original Egyptian type; the seat of all these alike in the natural year being at or about the autumnal equinox; the nearest to the epoch of the correction of the Hindu calendar, both before and after B. C. 946. We require nothing but the knowledge of this fact to explain the traditionary reckoning of the mansions from Mulā as the first in the division of 28, or from Jyesht'hā as the first in that of 27, implied in the meaning of those terms themselves. At present, according to Mr. Bentley[d], the epoch of both is fixed to a point in

[c] Loc. cit. p. 5. [d] Part i. sect. i. 5. ii. sect. ii. 129.

the heavens 2° 25′ west of the place of the star Antares: and as the mean longitude of that star, A. D. 1802, was 246° or 247°, it is manifest that 2° 25′ is very nearly the actual difference between its longitude and that of the xvi mansion in our fourth type, or that of Jyesht'hā in the Hindu type of A. D. 538, continued down to A. D. 1802.

The first mansion however in the Hindu division of 28 may be Mulā at present; and the first in that of 27 may be Jyesht'hā: but it is agreed that both these divisions, to which they stand in that relation respectively, are lunar, and liable to recede along with the tropical points perpetually. Besides these lunar mansions, thus moveable in this respect, the Hindus have also a scheme of sidereal mansions[e], the longitudes of which are fixed and invariable. The number of these sidereal mansions is 27, like that of one of the types of the lunar. And the names of these 27 sidereal mansions are the same as those of the 27 lunar ones. But the order of these 27 sidereal mansions, except *inter se* or relatively to one another, is not the same as that of the 27 lunar. These too follow each other in the same order as the lunar; but they are not reckoned from the same term in this order as the lunar. In other words, whether Mulā or Jyesht'hā be more properly the first lunar mansion at present or not; Aswinī it is agreed is the first of the sidereal[f]. The sidereal mansions all round the sphere are reckoned from Aswinī, as the lunar are from Mulā or Jyesht'hā.

Now the point to be attended to here is that, when this division of sidereal mansions was made, Aswinī was not the first mansion. It was constituted the first of this division; but it was not the first previously. We learn from the memoir of Mr. Colebrooke quoted by Delambre[g], that Aswinī, the first in the sidereal division, was the *last* but *one* in the preexisting lunar division. If that was the case; Kṛitikā in this lunar division must have been the first. For the order of Hindu mansions, under all circumstances, and all denominations whether of sidereal or of lunar, has always been the same, Aswinī Bharanī Kṛitikā; so that if Aswinī

e Bentley's Hindu Astronomy, part ii. sect. 1. 97—104.

f Cf. Delambre, Astronomie Ancienne, i. Liv. iii ch. iii. 447.

g Ibid. 500: 502, 503.

was originally the last but one, Kṙitikā must have been the first. This argument therefore is or ought to be decisive of the original order of the mansions; and in each scheme, whether that of 28 or that of 27. It may be confirmed however by another; taken from the reduction of the scheme of 28 to that of 27: and from the manner in which it appears to have been effected.

It is manifest that, in reducing a division of the ecliptic in general from 28 equal parts to 27, both of which must contain the same number of degrees collectively, some one member of the division of 28 must be absorbed in that of 27. The question is, what particular member that must be? or on what principle it would have to be determined? It will assist us to answer this question to know that the number of 28 was nominally retained even in the division of 27[h]; but that one term in this number, in its proper order of succession numerically, was past over or left out of the account; though it was suffered to stand upon the list and in its proper place in the order of succession too. And we are also told that the mansion, thus nominally retained but really suppressed in this cycle of 28 perpetually, was that which has the name of Abhijīt[h].

Now Abhijīt is the fourth term in the division of 28 at present, supposed to be reckoned from Mulā; but it is the twentieth, in the same division, supposed to begin with Kṙitikā. The question therefore being what mansion would require to be suppressed in order to reduce the division of 28 to that of 27; if it can be shewn that this must be the twentieth, it will follow that, Abhijīt having been from the first the mansion supprest, Abhijīt must always have been the twentieth; and therefore Kṙitikā must always have been the first.

The division of 28 and that of 27 being supposed to set out together from the same point of the ecliptic, $0° 0' 0''$, and the former being limited to $12° 51' 25''\cdot 714$ in each instance, the latter extended to $13° 20'$; the latter must gain on the former, through successive terms of the division in each, at a certain rate; which in strictness will be the difference of those two quantities, $12° 51' 25''\cdot 714$ and $13° 20'$; i.e. $28' 34''\cdot 3$: and this difference, 27 times repeated, would be found to

h Hindu Astronomy, Part i. sect. i. 5. note.

accumulate at last to 12° 51′ 25·7″; that is, to one entire mansion in the division of 28. On this principle therefore, the mansion belonging to the division of 28, which would thus be absorbed and excluded in the division of 27, would most properly be the last of all. Every preceding member of the division of 28 would enter more or less into the corresponding member of the same nominal appellation in that of 27. This only, the 28th of the former, would be totally absorbed in the 27th of the latter. If the suppression of some one mansion in the cycle of 28 had been determined in this manner, it must have been the last; yet even in that case and on that principle it is evident that there could have been no difference in the order and reckoning of the terms in the two cycles, from the first to the last of each*.

The suppression however of this one mansion in the cycle of 28, and the question which it should be, we apprehend, might be determined on a different principle; yet on one equally as probable and natural as the preceding. The stated length of each member of the division of 27 being 13° 20′; it is distributable into four equal parts, (i.e. quarters,) of 3° 20′ each: three of which would amount to 9° exactly. Now in reducing the longitudes of the mansions in a scheme of 28 to those of the mansions in a scheme of 27, it might evidently be laid down beforehand as a rule, that so long as the longitude of a particular mansion in the order of 28 did not fall 9°, or three quarters of an entire mansion in the scheme of 27, short of the longitude of the same numerical mansion in the scheme of 27, it should be considered premature to suppress it; but that, as soon as that was the case, it should be omitted, and passed over in its proper reckoning

* The mansion suppressed, on this principle, must have been Indrā; the mansion next to Anurādhā. Indrā must have been the mansion left out at last, in reducing the cycle of 28 to the cycle of 27, on such a principle as this. And there is reason to believe that Indrā was actually suppressed in this manner. Jyesht'hā at least, in the division of 27, is said to have corresponded to Mulā in that of 28: in which case the 27th and 28th terms from Mulā must both have corresponded to the 27th from Jyesht'hā; and those two would be Anurādhā and Indrā: and Indrā of the two would properly be the mansion which required to be suppressed. Anurādhā, reckoned from Jyesht'hā, would contain only 28′ 34″·3 of Anurādhā reckoned from Mulā, but all of Indrā.

altogether. And a rule like this having been laid down beforehand; it is easy to shew that the mansion which it would be necessary to omit, in the course of time, in conformity to such a rule, and in the numerical order of 28 terms of the same kind before and after, would be the xxth, that is Abhijīt:

In the scheme of 27 terms, the long. of the xixth mans. is	240° 0′ 0″
In that of 28, the longitude of the xixth is	231 25 43
The difference is	8 34 17

or 25′ 43″ less than 9°.

In the scheme of 27 terms, the long. of the xxth mans. is	253° 20′ 0″
In that of 28 terms, it is	244 17 9
The difference is	9 2 51

And this just exceeds the prescribed limit by 2′ 51″. The xxth term then in the cycle of xxviii would be the first to require to be suppressed in conformity to the rule: and the proper name of the mansion *de facto* so suppressed in the Hindu cycle of xxviii having always been Abhijīt; it follows that Abhijīt must always have been the xxth mansion in that cycle; and therefore Kṛitikā must always have been the first. This point then may be considered established, that Kṛitikā was the first mansion in the original scheme of Hindu mansions; yet Kṛitika in that always corresponded to the xxviii in the Egyptian of type i, the first in the Egyptian of type iii: the latter of which came to correspond to the former only in B. C. 848. It follows from this fact that the Hindu mansions could not be older than the Egyptian of type iii, B. C. 848: and therefore that, if they were first admitted into the sphere at the epoch of a period of 247 years, they could not have been admitted before B. C. 699. It remains to shew that, though first admitted *de facto* only at that time, they were nevertheless set back at once 247 years, i. e. to B. C. 946; and consequently that they were treated from the first as if they had been admitted in B. C. 946.

SECTION VIII. — *On the proof of the second proposition, that the Hindu mansions, though admitted only in* B.C. 699, *were set back to* B. C. 946.

The oldest traditionary or historical testimony to these mansions, and the most authentic also, appears to be some-

thing which Mr. Bentley has quoted from the Vedas[i]: and from this we learn the following facts, supposed to have held good of them from the first.

i. That when these mansions were formed, (the meaning of which we shall now understand to be simply, were first introduced into the Hindu sphere,) the vernal equinoctial point (0° 0′ 0″) was falling in the beginning of Kṛitikā.

ii. That the summer solstice was found to be falling in the 10 of As′leshā.

iii. That the autumnal equinox was found to be falling in the middle of Rādhā, i. e. bisecting Rādhā; which from that circumstance received thenceforward the name of Visākhā, meaning bisection.

iv. That the winter solstice was found to be falling in 3° 20′ of Dhanisht′hā.

Mr. Bentley does not appear to have seized on the meaning of these statements with his usual sagacity; having been so far misled by the false representations of the Hindu writers themselves, as to think of finding out and verifying these different criteria or characteristics of the mansions 480 years before the time when they were really to be discovered; that is in B. C. 1426 instead of B. C. 946. In our opinion however there cannot be a clearer designation of the sphere of B. C. 699, as merely reduced to that of B. C. 946 on the principle of the *reditus retro*, than these different criterions supply. We have drawn out the succession of the different types of the Hindu mansions, from B. C. 946 to A. D. 538, in periods of 247 years each asunder; which we shall submit to our readers by and by. They have only to refer to the first type of all, that of B. C. 946, to see each of these descriptions of the four cardinal points, and of their relations to the mansions respectively, verified to the letter therein.

i. The longitude of Kṛitikā, the first mansion, in that type, is seen to be 0° 0′ 0″. Therefore the vernal equinox was fallingly exactly at the beginning of Kṛitikā.

ii. The longitude of the seventh mansion As′leshā is seen to be 80°: consequently the summer solstice (which must fall in 90°) was falling in the 10° of this mansion: i. e. at the end of this tenth degree exactly; in which sense this mode of

i Part i. sect. i. 2.

speaking of such incidences, to judge from other examples of the same kind which are on record, must always have been intended to be understood.

iii. The longitude of the xivth mansion, Rādhā before, Visākhā afterwards, was 173° 20′: consequently the equinox of autumn (in 180°) was falling just in the middle of this mansion, in 6° 40′, understood as above explained.

iv. The longitude of the xxist mansion, Dhanisht'hā, was 266° 40′; and consequently the winter solstice, falling in 270°, was falling in 3° 20′ of this mansion, understood as before, exactly.

If these coincidences are not sufficient to identify the sphere and the mansions, of which they were intended, with those of B. C. 699, set back to B. C. 946; we know not what can be. It is an obvious remark too that, if the testimony of this Veda thus identifies the sphere of B. C. 699 with that of B. C. 946; the identity of the sphere of B. C. 946 with that of B. C. 699 determines reflexively the age of this Veda. This Veda cannot be older than the sphere of B. C. 699, from which that of B. C. 946 was obtained: but it may be younger. The Veda which contains this testimony could not have been composed before B. C. 699, but it might have been much after. This however is a question on which *we* have no occasion to enter at present. The hint which we have thrown out will not be lost on Sanscrit scholars, who think of the precept of Epicharmus:

νῆφε καὶ μέμνησ' ἀπιστεῖν *.

* The Vedas indeed are not all of equal antiquity; consequently an argument of the age of one of them is not necessarily a proof of that of another. The argument derivable from the coincidence just pointed out can apply only to the age of the Veda in which it is found.

It seems to be agreed that the first and oldest of the Vedas is the Rig-Veda-Sanhitá; the first asht'aka or book of which has just been made accessible to an English reader through the translation of it by Professor Wilson, recently published by the Board of Directors of the East India Company. (London, 8vo. 1850.)

It is but lately that we have had an opportunity of examining this portion of the Vedas. The above quotation from Mr. Bentley does not appear in it. We find in it, in fact, no allusion to the lunar mansions whatsoever; nor even the word mansion in connection with the moon, except once at p. 217, (sixth Adhyáya) in one of the hymns to Indra, (Súkta xi

ii. It is a remarkable coincidence that, if we go back to B. C. 946 from B. C. 699, we find the mean vernal equinox, for the meridian of our own tables, falling on April 1, at 19 h. 12 m. 43 sec. 12 th.; and consequently for any meridian,

(lxxxiv.) ver. 15: "The (solar) rays found on this occasion the light of SWASHTRI verily concealed in the mansion of the moving moon:" in which it does not appear that the scholiasts or commentators on this Veda ever supposed any reference to be implied to the lunar mansion properly so called; nor to any thing but the physical fact of the derivation of the light of the moon from that of the sun. We must conclude therefore from the total absence of all such allusions in this portion of the Vedas (the oldest of all) that the authors of the hymns which compose this particular Sanhitá knew nothing as yet of the lunar mansions. If they had known of them, it is morally certain that they must have alluded to them.

Perhaps it will be supposed that this is an internal evidence of the great antiquity of this part of the Vedas. But the utmost which it can prove concerning it is that it is probably older than the reception of the mansions into the Hindu sphere: i. e. it may be older than B. C. 699—a much lower date than that which the learned translator claims for it. There is internal evidence however even in this Veda that though it may be older than B. C. 699, our assumed date of the reception of the mansions into the Hindu sphere, it cannot be older than B. C. 946—the date of the Metonic correction of the Hindu calendar—after which, but not before, it was always a lunar, and no longer a solar, calendar.

i. There are allusions in this Veda to the *six* seasons of the Hindu year; a division compatible only with a fixed solar calendar, and therefore not older than the first fixation of the solar calendar, B. C. 946, when the Metonic cycle was introduced into the calendar also. P. 57, (second Adhyáya, Súkta vi (xxiii.) ver. 15 (part of an address to PÚSHAU) "Verily he has brought to me successively the six (seasons)"—where the text indeed has only the word for *six*, *shat*; but the comment of the scholiast shews the six seasons were always supposed to be meant. Cf. also p. 248, seventh Adhyáya Súkta ii (xcv.) ver. 3: also p. 36, ist Adhyáya Súkta iv (xv.)

ii. There is an allusion to the twelve months, as the regular complement of the months of the year, and to a thirteenth or supplementary month also; which must consequently be the intercalary month of the lunæsolar year: p. 65, second Adhyáya Súkta ii (xxv.) an hymn to VARUÑA, ver. 8: "He who accepting the rites (dedicated to him) knows the twelve months and their productions, and that which is supplementarily engendered." Professor Wilson considers this passage an obscure one; but the scholiast understood it of the lunar year, and its supplementary or intercalary month; "the thirteenth or additional month which is produced of itself in connection with the year;" and the professor acquiesces in this construction. This passage therefore cannot be older than

which might be assumed in India, necessarily two or three hours later. B. C. 699, the mean vernal equinox was falling March 30, 15 h. 16 m. 12 s.; i. e. two days earlier. It apappears too that the Julian or sidereal date of the xxviiith

B. C. 946; unless the lunæsolar year of the Hindus was older too: but it may be younger.

iii. A singular wish occurs in this Veda: p. 176, fifth Adhyáya Súkta vii (lxiv.) in an hymn to the *Maruts* (the winds) ver. 14: " May we cherish such a son and such a grandson for a hundred winters:" and again, p. 196, Súkta ix (lxxiii), in an hymn to Agni (the impersonation of fire), ver. 9: " Defended, Agni, by thee may ... our sons ... live for a hundred winters." Professor Wilson is inclined to consider this association of existence (as measured by time) with winters an internal evidence, not of a native Hindu origin of these hymns, but of a northern extraction. It may be so. But in our opinion it is sufficient to explain it that, ever after the correction of B. C. 946, the head of the calendar itself was more closely connected with the winter half of the year, than with spring or summer—and in the course of time, and with successive advances of the epoch, agreeably to the rule laid down at first for that purpose, would become more and more so. In another instance (p. 230, Adh. vi. Súk. v. lxxxix. ver. 9.) the term of human life is assumed at one hundred years; and under such circumstances, one hundred calendar years could not have been more properly expressed than by one hundred winters.

In this portion of the Vedas, Indra is twice alluded to under the name of the Ram (Mesha): p. 135, Adhyáya fourth, Súkta i (li.) ver. 1: p. 140, Súkta ii (lii.) ver. 1: and Agni once under that of the Lion, Sinha: p. 249, Súkta ii (xcv.) ver. 5. Both these allusions are confessedly obscure; but to allow even that the one is to be understood of the Ram, and the other of the Lion, of the sphere itself, they would not prove that this Veda was older than B. C. 848. The allusion to the Lion is the more significant of the two in this respect; for it seems from the context to imply an acquaintance with the birth of fire or light first in the sign of the Lion: a doctrine as old as B. C. 1106 at Babylon, but received in Egypt only in B. C. 798. It may be collected however from one of these hymns, that the true birthday of light and fire, as personified by this abstraction of Agni, was the vernal equinox: p. 157, fourth Adhyáya Súkta ii (lxix.) ver. 1 sqq. In other words, the Hindu cosmogony in this respect, in the time of the authors of these hymns, did not differ from that of the rest of the world.

Neither can we discover in this portion of the Vedas, any internal evidence from the allusions and language which it employs throughout, that the noctidiurnal cycle in the time of these authors was yet reckoned in conformity to the modern Hindu rule, that is, from morning; the rule which we have supposed an innovation on the primitive one, common to India with the rest of the world, and not of older

mansion in the ist type, the ist mansion in the iiid type, B. C. 848, and answering to Kṛitikā in the Hindu, was April 1 also. It is a characteristic rule of the Hindu calendar at present, and it appears to have been so from time immemorial, that the solar months are reckoned from the ingress of the sun into the same sign of the celestial calendar. It is manifest, from the coincidence just pointed out, that this rule would be strictly applicable to the calendar solar month coincident with Aries or Krion B. C. 916, dated on April 1 itself. If we reckon 92 days, the length of the first quarter in the sphere of Mazzaroth, from April 1, the date of the mean vernal equinox, we come to July 2, as the date of the mean summer solstice, and of the ingress of the sun into Cancer, and of the first of the months of summer in the calendar; and if we reckon 91 days on from that, we come to October 1, as the date of the autumnal equinox, and of the ingress of the sun into Libra, and of the first of the months of autumn in the calendar. And having come to October 1, in this manner, as the date of the autumnal quarter, and of the first of the months of that quarter in the calendar, we have come to the very day which appears to have been fixed

date that the second of the miracles of Scripture. On the contrary, it may be collected from this class of allusions, (and they are more numerous than any other,) that the day was still supposed to follow the night; night was considered to take precedence of the day; the day was born of the night rather than the night of the day; the cycle itself had been eternal, but always in this order, first the night and then the day; and the stated and regular association of these ideas in the Hindu mind of this time was the same as every where else, night and day, not day and night. We think it unnecessary to produce particular passages; but we refer our readers generally to page 32, Adh. i. Súkta ii. ver. 7: 63, Adh. ii. Súk. i. (xxiv.) ver. 10: 12: 94, Adh. iii. Súk. iv. (xxxiv.) ver. 2: 95, Ibid. ver. 3: 96, Ibid. ver. 8: 99, 100, Súk. v. (xxxv.) ver. 10: 120, Súk. i. (xliv.) ver. 8: 123, Súk. ii. (xlv.) ver. 10: (cf. 126, xlvii. ver. 1.): 125, Súk. iii. (xlvi.) ver. 14: 169, Adh. v. Súk. v. (lxii.) ver. 8: 196, Súk. ix (lxxiii) ver. 7: 231, Adh. vi. Súk. vi. (xc.) ver. 7: 238, Súk. viii. (xcii.) ver. 11: 246, Adh. vii. Súk. ii. (xcv.) ver. 1: 252, Súk. iii. (xcvi.) ver. 5: 255, Súk. v. (xcviii.) ver. 7: 267, Súk. xi. (civ.) ver. 1: 296, Súk. vii, (cxii.) ver. 24, 25: Ibid. Adh. viii. Súk. viii. (cxiii.) ver. 1: 297, Ibid. ver. 2–4: 298, Ibid. ver. 8. 10: 307, Suk. i. (cxvi.) ver. 4: 313, Ibid. ver. 24. cf. 316, Ibid. ver. 12.

Lastly the hebdomadal cycle is alluded to in this Sanhitá, though in figurative language; (133, Adh. iv. Súk. vii. (L.) ver. 8, 9:) which proves that it was in use in India in the time of its author.

upon, B. C. 946, as the new year's day of the lunar and solar correction of the calendar itself, made in that very year.

With regard to the solar months of the Hindu calendar, we copy the following statement of their order and of their names at present from Mr. Bentley[k]: adding to them ourselves the names of the signs and of the months in the calendar of Mazzaroth to which they correspond respectively.

Solar calendar of the Hindus. Order and names of the months.

Hindu	Signs	Mazzaroth	Hindu	Signs	Mazzaroth.
Māgha	Capricorn	Ægon	S'rāvana	Cancer	Karkinon
Phālguna,	Aquarius	Hydron	Bhādra	Leo	Leonton
Chaitra	Pisces	Ichthyon	As'wina	Virgo	Parthenon
Vais'akha	Aries	Krion	Kārtika	Libra	Zygon
Jyaishtha	Taurus	Tauron	Mārgas'irsha	Scorpio	Scorpion
Ās'hāra	Gemini	Didymon	Pausha	Sagittarius	Toxon.

These months being thus the same as the Twelve Signs, it follows that their sites in the natural year are fixed, relatively to the signs at least; and that they can vary, relatively to the Julian year, only as the cardinal points, or actual solar ingresses into the different signs, may do so too. On this principle, the month of Māgha must always have coincided with Capricorn or Ægon; Vais'akha always with Aries or Krion; S'rāvana with Cancer or Karkinon; and Kārtika with Libra or Zygon.

The Hindus themselves pretend to have had these months in their calendar and under these names from time immemorial; and yet to have derived them originally from the lunar mansions; and even to have given them these names from certain coincidences, at the time of the derivation,

k Part i. Section i. 8. Cf. Sir Will. Jones, iv. p. 75: On the antiquity of the Indian zodiac: where the English of the Sanscrit names is given. Sir W. Jones in the same place of this Essay quotes an account of these signs of the Hindu sphere in Sanscrit verse, from Srípeti author of the Retnamálà, with an English translation, as follows:

"The *ram, bull, crab, lion,* and *scorpion,* have the figures of those five animals respectively: the *pair* (*Mit'huna*) are a damsel playing on a *vinà* and a youth wielding a mace: the *virgin* stands on a boat in water, holding in one hand a lamp, in the other an ear of rice-corn; the *balance* (*Tulà*) is held by a weigher with a weight in one hand: the *bow* (*Dhanus*) by an archer whose hinder parts are like those of a horse: the *sea-monster* (*Macara*) has the face of an antelope: the *ewer* is a water-pot borne on the shoulder of a man who empties it: the fish (*Mína*) are two with their heads turned to each others' tails: and all these are supposed to be in such places as suit their several natures."

This sphere is plainly the Egyptian, yet of the revision and type of B. C. 848, in which first the balance and the ewer in particular obtained admission.

between them and the corresponding mansions: after the manner explained by Mr. Bentley[l]. We do not hesitate to reject this statement as an idle tale. We believe, of course, that the Hindu calendar was always possessed of proper solar months; but, of course also at first, only of those of the primitive solar year. As to these solar months in particular, we do not believe that any one of them is older than B. C. 946. And possibly they may not be so old; though whensoever these months were contrived, and introduced into the calendar in their present positions in the natural year and under their present names, we are still of opinion that they were purposely adapted to the state of the calendar in B. C. 946. We could not however with propriety enter on this question at any length. We will mention one or two arguments only of the truth of what we have asserted; that whether contrived at this very time, or at a later, (and in that case most probably in B. C. 699,) every thing relative to this solar calendar of the Hindus, and most characteristic of it, was purposely adapted to the state of things in B. C. 946.

i. According to the peculiar rule which the Hindus laid down for the administration of the calendar, in connection with the period of 247 years, it was necessary to change the beginning of the year at the beginning of each of those periods; and when the head of the calendar was set forward one month, the next month was to be assumed as the first of the year. It appears from the synopsis of the process, which we have exhibited supra[m], that this was done actually or virtually six times, at the end of so many periods of 247 years, from B. C. 946 or B. C. 699, down to A. D. 538; and that the head of the calendar was raised by six different steps, from the autumnal equinox and from the month which corresponded to Libra or Zygon, viz. Kārtika, to the vernal equinox, and to the month which corresponded to Aries or Krion, that is Vais'akha. The calendar reckoning was raised through six periods, six signs, and six months, from Kārtika, with which it set out, to Vais'akha, with which it stopped; before it ceased to be raised any longer, or at least in the same way as before.

Now what is the meaning of this name Vais'akha? or does

[l] P. 8. [m] P. 46.

it mean any thing different, as applied to one of the months of the calendar, from that of Visākhā, applied to one of the mansions? For if not, then this must denote the middle month of the calendar, just as that did the middle mansion; the month which bisected the year or the calendar, like the mansion which equally divided the mansions. Where then are we to find the first month of the year, of which Vais'akha was thus the sixth? If the Hindus are to be believed, in Māgha; and at the winter solstice; which would be impossible. S'rāvana might have been the Vais'akha of the year and of the calendar, reckoned from Māgha; but Vais'akha, properly so called, the fourth from Māgha, never could have been so. To judge therefore from the etymology and signification of the name of this month, it must have been bestowed on the month which has always borne it, when it was critically bisecting both the natural year, by falling at the vernal equinox and by answering to Aries or Krion, and the civil year too, by occupying the middle place in that, or by being the seventh in order from the first, whatsoever that was. Now Vais'akha being the seventh month, Kārtika must be the first month: and if Vais'akha corresponded to Aries or Krion, Kārtika must do so to Zygon or Libra. We have seen that each of these things would actually be the case B. C. 946; if the months first received their names then, or if, whensoever they received them, these names themselves, and the order of the months relatively to one another, were critically accommodated to the state of the case in B. C. 946.

ii. Mr. Bentley informed us [n] that the meaning of Jyesht'hā, as applied to the first of the mansions in the cycle of 27, was "First" or "Eldest:" and it does not appear to us that Jyaishtha, the name of the month, is a different word at bottom from Jyesht'ha, the name of the mansion. Now Jyaishtha is the name of the month next to Vais'akha; the month next to Aries; the month which answered to Taurus and Tauron. On this principle, this month must have been purposely called by a name denoting "Fore" or "Elder." But "Fore" or "Elder" in relation to what? We do not hesitate to answer, in relation to Vais'akha. Jyaishtha was the *fore* or the *elder* Vais'akha: and Vais'akha was the *after*

[n] Supra, p. 53.

or *younger* Jyaishtha. This is explained first by the relation of the solar months of the Hindu calendar to the signs: that Jyaishtha was the representative of Taurus, Vais'akha was that of Aries: and secondly by the relation of the signs to each other; that the Taurus of this period, B. C. 946, was the Aries of the beginning; that natural annual time, which was now beginning in Aries, originally began in Taurus; and that Taurus was still the true Aries of the beginning, the Krion of Mazzaroth at least; in a word the Fore or Elder Aries, in contradistinction to the after or younger, Vais'akha, which was now representing it. For we have already seen that the Hindus were not ignorant of this great natural and chronological truth, that mundane time really began in Taurus, any more than the Egyptians or the Chinese; and that this was the reason why they always represented Siva, the greatest of their gods according to Mr. Bentley, and the impersonation of Time, as riding on the Bull of the sphere.

iii. The solar months of the Hindu calendar always beginning with the ingress of the sun into the corresponding sign, Mr. Bentley has shewn very clearly[o], (and from the nature of the peculiar rule of the administration of the calendar it could not be otherwise,) that the solar and the lunar month, at the beginning of each of their periods of 247 years, must coincide under similar circumstances perpetually; the solar month falling at the end of the sixth day of the lunar, and the mean longitude of the moon, at the same time, being always 2 signs, 12° (the difference of six days of mean lunar motion, and six days of mean solar,) more advanced than that of the sun. It is manifest however, that this never could have been the case at the end of every subsequent period of 247 years, unless it had begun to be the case, or had been supposed to have begun to be so, first B. C. 946: that is, unless both the peculiar rule of reckoning the solar months from the ingresses into the corresponding signs, and that of reckoning the lunar months from the *luna sexta* or *septima*, had both been introduced in conjunction, or both had been supposed to have been so, first in B. C. 946.

Now there cannot be any doubt that this relation of the solar and the lunar months to each other is as true *de facto*

[o] Part i. sect. i. 33.

of the state of the calendar at the epoch of the first of these periods B. C. 946, as at that of the next, B. C. 699, or at that of any of those which followed upon it. But the question is, what made it so in B. C. 946, as well as B. C. 699, or at any later period? The rule of the administration, it is evident, would render it so at the epoch of every subsequent period of 247 years: but what would make it so in the first instance of all? Certainly not the rule of the administration; for that was not then in being. What then but a positive appointment? This is a point which Mr. Bentley has not explained: nor indeed without a knowledge of the previous history of the calendar could it have been explained. But the truth is the calendar had just been corrected on the cyclico-Julian principle, B. C. 946, and thereby brought back to its normal or rectified date of September 25. September 25 was the date of the *luna prima;* and the ingress of the sun into Libra or Zygon, it was easy to calculate, would take place on the seventh day after, October 1: and October 1 being appointed the new years' day, instead of Sept. 25, or supposed to have been so, the relation of the solar to the lunar month, B. C. 946, at the beginning of the first of these periods of 247 years, would be exactly the same in this first instance of all, as at the beginning of any other after it.

iv. Mr. Bentley informs us[p] that the month which corresponded to Libra or Zygon having been found coinciding with the lunar asterism or mansion Vis'ākhā at the epoch of this correction of B. C. 946, according to rule it became the first of the calendar. It is very true that at the autumnal equinox, B. C. 946, in the Hindu type of the mansions of that date, the sun must be found in the middle of Vis'ākhā, or, as it was before called, of Rādhā. But it may very well be questioned whither this was the reason why Kārtika was constituted, or was supposed to have been constituted, the first month. It was quite sufficient for that purpose, that Kārtika was coinciding with the ingress of the sun into Libra or Zygon.

This month, as both the scheme of periods of 247 years supra[q], and that of the months last proposed[r], shew, was Kārtika, the seventh before Vais'akha at the opposite point of the year; and Mr. Bentley has mentioned several facts, con-

p Part i. sect. i. p. 32. q P. 46. r P. 64.

nected with this month and under this name, from which we may infer that it must have received its name at this time, or have been supposed to have done so.

He tells us that to render this designation of Kārtika, as the first month, the more remarkable[s], and the more effectually to perpetuate the memory of it, they fabled the birth of Kartikeya, the Hindu Mars or god of war, in this month; whom he considers nevertheless only a personification of the year, as beginning in this month[s]. We may perceive a reason for connecting the birth of their Mars with the autumnal equinox, because that was the beginning of the military season in India; being the time when the wet weather ceased, and the dry weather set in. But why in Kārtika? and why under the name of Kartikeya, in B. C. 946 only; if there had been always a Kārtika in their calendar, and always coincident with the autumnal equinox, before B. C. 946 as well as after?

He tells us also[s] that they instituted a festival in honour of him, which they called *Guha Shasti;* Guha denoting Kartikeya, and Shasti the sixth day of the moon on which the year began: a very plain intimation that all this was later than the first introduction of the rule which attached the new years' day to the *luna sexta* or *septima;* and therefore than the time when Kārtika really became the first month, under that name itself. At this festival, it was usual to represent him riding on a peacock; which Mr. Bentley explains of his leading on the year, followed by the stars and the planets in his train: and various epithets were familiarly applied to him, all founded on the same supposition of the relation of priority or precedence in which he stood to the year, and to every thing most closely connected with the year:

Shadānana or *six-faced;* in allusion to the six seasons of the year[t].

Dwādas'alochana, *twelve-eyed,* in allusion to the twelve months.

Visākā, in allusion to the commencement of the year in that asterism or mansion; or, as we should rather understand it, in allusion to the position of the month Kārtika itself as dividing or bisecting the year.

[s] Astronomy, part i. sect. ii. p. 32. [t] Cf. sect. i. p. 6.

These designations and descriptions leave no doubt in our mind that the month which gave name to Kartikeya was not only the first month in the calendar, when it was first called Kārtika, but was first called Kārtika, or assumed to have been first so called, in B. C. 946—when the Guha Shasti, or first day of Kārtika itself, was first designated or was supposed to have been first designated the birthday of Kartikeya.

v. It must be observed however that nothing which was done, or supposed to have been done, B. C. 946, would have the effect of constituting Kārtika the first month at that time. Kārtika was always the first month, ever since the cyclico-Julian correction of B. C. 1306; though not under the name of Kārtika. It was still the first month B. C. 946, at the epoch of the last correction on the cyclico-Julian principle, when it had just been brought back to its normal epoch of September 25; and when it was advanced, or supposed to be advanced, in conformity to a new rule of administration, from September 25 to October 1. Nothing that was done, or was supposed to have been done, at this time made Kārtika the first month. At the utmost, it only declared it to be so in the new calendar, and according to the new rule of administration, as much as according to the old; and at the utmost only under the name of Kārtika, a name which the first month itself might not have borne until then.

Now this serves to explain a very material circumstance in the history of the subsequent corrections of the calendar according to the rule supposed to have been introduced B. C. 946; which it would not be easy, on any other principle, to explain. Mr. Bentley informs us[u], that the third period (he means that of the epoch of B. C. 699) began with the month Mārgas'irsha, according to rule; this being the next to Kārtika: and he says it received at that time the name of Agrahāyana, to express this circumstance of its being appointed, *extra ordinem*, to begin the year; which name, he tells us, it retained ever after, even when it had long ceased to be the first in the year.

Now if Mārgas'irsha received a new name, and one of such a meaning and import as this, B. C. 699, when it became the

[u] Part i. sect. i. 34, 35.

first in the calendar, why did not Kārtika receive a new name, and of like meaning and signification, B. C. 946, when that too became the head of the calendar? that is, if it was not the head of the calendar before; if it was constituted the head of the calendar *extra ordinem*, for the first time, then. It would be ridiculous to ask that question, if Kārtika had been already the first month in the calendar 360 years before B. C. 946; but not so, if it was becoming the first for the first time then. We confess that this consideration, as much as any thing else which has yet been mentioned, inclines us to come to the conclusion that, though the months might have received their peculiar names as early as B. C. 946 *, the peculiar rule of administration, founded on the period of 247 years, and including this of the constant succession of a fresh month with a fresh period to the head of the calendar, could not have been introduced *de facto* before B. C. 699; though when introduced, it might at once have been carried back to B. C. 946, and treated as if it had been in force from the very first.

* We learn from sir W. Jones (Works, iv. 127, 128) that the solar Hindu months anciently had different names from those which we have just been considering, and which they bear at present. These names, it appears, were the following:

Madhu	Isa
Mádhava	Urja
Sucra	Sahas
Suchi	Sahasya
Nabhas	Tapas
Nabhasya	Tapasya.

These names are taken from a passage in the Veda; a commentary on it, relating to the six seasons. According to sir W. Jones (loc. cit.), the first in this series, Madhu, must be supposed to answer to Chaitra, (Pisces or Icthyon), supra, p. 64: in which case Isa would be found to answer to Ās'wina, (Virgo or Parthenon.)

We should be of opinion that these names were given to the months at the time of the cyclico-Julian correction, B. C. 1306. It is much to be regretted that sir W. Jones did not think proper to go further into the history of these names. Some of them appear to be double names; or the same name merely repeated: Nabhas, and Nabhas-ya: Sahas, and Sahas-ya: Tapas, and Tapas-ya. But the most remarkable are Isa, the viith, and Urja, the eighth: the former answering to Ās'wina, the latter to Kārtika. Isa is very similar to Isis, particularly to Isis in the form of Isa, as we conjectured might be the real explanation of her name—from the Hebrew for wife: and Urja seems to resemble Durgā, whose festival itself, B. C. 1306, would be actually attached to this month.

SECTION IX.—*Scheme of the succession of the Hindu mansions through six different types, from* B. C. 946 to A. D. 538.

These points then having all been established, i. That the Hindus received the mansions between B. C. 848 and B. C. 699: ii. That they introduced them first into their sphere in B. C. 699: iii. That they set them back nevertheless to the epoch of their lunæsolar correction, B. C. 946: this is the proper time and place to exhibit the several successions or types of these mansions, from B. C. 946 to A. D. 538. But in the first place we must point out the change which it was necessary that they should undergo to accommodate them to the epoch of B. C. 946; and which they appear to have actually undergone in reducing them from the epoch of B. C. 699 to that of B. C. 946.

The date of the third Phœnix period of the Egyptians was B. C. 847; and the interval from B. C. 847 to B. C. 699 was 148 years; in which precession according to our table would accumulate to 2° 3′ 30″· 292 068. Now the longitude of mansion xxviii, type iii, B. C. 847 was

	1° 3′ 3″· 826 695
148 years' precession,	2 3 30 · 292 068
Longitude of mansion xxviii, B. C. 699	3 6 34 · 118 763

And this would be strictly the longitude of the mansion Kṛitikā in the Hindu scheme, B. C. 699, according to our tables. In 247 years precession amounts to 3° 26′ 7″· 176 627, as we have seen [u]. Hence

Longitude of Kṛitikā, B. C. 699..	3° 6′ 34″· 118 763
Subtract 247 years ..	3 26 7 · 176 627
Longitude of Kṛitikā, B. C. 946	359 40 26 · 942 136

The Hindu astronomers however assumed the precession in 247 years at 3° 20′ exactly. On this principle the longitude of Kṛitikā, B. C. 946, would be 359° 46′ 34″· 119: and this is so near to 360°, or 0° 0′ 0″, that no one could say it might not be assumed as 0° 0′ 0″ exactly. It is certain at least that the Hindu astronomers of B. C. 699 must have assumed the mean longitude of Kṛitikā B. C. 946 as 0° 0′ 0″: and therefore that they must have reckoned it B. C. 699 at 3° 20′ 0″ exactly; which, though 13′ 26″ greater than what is shewn by our own tables at the same time, is nevertheless not materially different from it.

[u] Supra, p. 51.

Hindu mansions. *Moveable*, Type i *to* vi. B. C. 946 *to* A. D. 538. *Immoveable or Sidereal*, Type i A.D. 538—A.D. 1802.

HINDU MANSIONS. Moveable.		Type i. — B. C. 946.		Type ii. — B. C. 699.		Type iii. — B. C. 452.		Type iv. — B. C. 205.		Type v. — A. D. 44.		Type vi. — A. D. 291.		Type vii. — A. D. 538.		HINDU MANSIONS. SIDEREAL. Immoveable.		i. A. D. 538.		ii. From ζ Piscium.		A. D. 1832.		
		Deg.	min.	Deg.	min.	Deg.	min.	Deg.	min.	Deg.	min.	Deg.	min.	Deg.	min.			Deg.	min.	Deg.	min.	Deg.	min.	sec.
i	Kṛitikā	0	0	3	20	6	40	10		13	20	16	40	20		i	Aswinī	6	40	0	0	17	34	47·899
ii	Rohinī	13	20	16	40	20		23	20	26	40	30		33	20	ii	Bharanī	20		13	20	30	54	47·899
iii	Mṛigas'iras	26	40	30		33	20	36	40	40		43	20	46	40	iii	Kṛitikā	33	20	26	40	44	14	47·899
iv	Ārdrā	40		43	20	46	40	50		53	20	56	40	60		iv	Rohinī	46	40	40		57	34	47·899
v	Punarvasu	53	20	56	40	60		63	20	66	40	70		73	20	v	Mṛigas'iras	60		53	20	70	54	47·899
vi	Pushyā	66	40	70		73	20	76	40	80		83	20	86	40	vi	Ārdrā	73	20	66	40	84	14	47·899
vii	Ásleshā	80		83	20	86	40	90		93	20	96	40	100		vii	Punarvasu	86	40	80		97	34	47·899
viii	Maghā	93	20	96	40	100		103	20	106	40	110		113	20	viii	Pushyā	100		93	20	110	54	47·899
ix	Purva Phalgunī	106	40	110		113	20	116	40	120		123	20	126	40	ix	Ásleshā	113	20	106	40	124	14	47·899
x	Uttara Phalgunī	120		123	20	126	40	130		133	20	136	40	140		x	Maghā	126	40	120		137	34	47·899
xi	Hastā	133	20	136	40	140		143	20	146	40	150		153	20	xi	Purva Phalgunī	140		133	20	150	54	47·899
xii	Chitrā	146	40	150		153	20	156	40	160		163	20	166	40	xii	Uttara Phalgunī	153	20	146	40	164	14	47·899
xiii	Swāti	160		163	20	166	40	170		173	20	176	40	180		xiii	Hastā	166	40	160		177	34	47·899
xiv	Vis'ākhā or Rādhā	173	20	176	40	180		183	20	186	40	190		193	20	xiv	Chitrā	180		173	20	190	54	47·899
xv	Anurādhā	186	40	190		193	20	196	40	200		203	20	206	40	xv	Swāti	193	20	186	40	204	14	47·899
xvi	Jyesht'hā or Indrā	200		203	20	206	40	210		213	20	216	40	220		xvi	Vis'ākhā	206	40	200		217	34	47·899
xvii	Mulā	213	20	216	40	220		223	20	226	40	230		233	20	xvii	Anurādhā	220		213	20	230	54	47·899
xviii	Purva Āshād'hā	226	40	230		233	20	236	40	240		243	20	246	40	xviii	Jyesht'hā	233	20	226	40	244	14	47·899
xix	Uttara Āshād'hā	240		243	20	246	40	250		253	20	256	40	260		xix	Mulā	246	40	240		257	34	47·899
	*Abhijīt															xx	Purva Āshād'hā	260		253	20	270	54	47·899
xx	Śravanā	253	20	256	40	260		263	20	266	40	270		273	20	xxi	Uttara Āshād'hā	273	20	266	40	284	14	47·899
xxi	Dhanisht'hā	266	40	270		273	20	276	40	280		283	20	286	40		*Abhijīt							
xxii	Śatabhishā	280		383	20	286	40	290		293	20	296	40	300		xxii	Śravanā	286	40	280		297	34	47·899
xxiii	Purva Bhādrapadā	293	20	296	40	300		303	20	306	40	310		313	20	xxiii	Dhanisht'ha	300		293	20	310	54	47·899
xxiv	Uttara Bhādrapadā	306	40	310		313	20	316	40	320		323	20	326	40	xxiv	Śatabhishā	313	20	306	40	324	14	47·899
xxv	Revatī	320		323	20	326	40	330		333	20	336	40	340		xxv	Purva Bhādrapadā	326	40	320		337	34	47·899
xxvi	Aswinī	333	20	336	40	340		343	20	346	40	350		353	20	xxvi	Uttara Bhādrapadā	340		333	20	350	54	47·899
xxvii	Bharanī	346	40	350		353	20	356	40	360		3	20	6	40	xxvii	Revatī	353	20	346	40	4	14	47·899

SECTION X.—*Observations on the preceding schemes.*

The period of 247 years among the Hindus was to all intents and purposes the same as the Phœnix period among the Egyptians. It was a Phœnix period, of half the length. And as this Egyptian period was connected from the first with the revision of the sphere, so does this Hindu one appear to have been; and as the former measured the duration of a particular type of the sphere among the Egyptians, so did the latter the duration of one among the Hindus.

It is therefore most reasonably to be supposed that the Hindu sphere having been revised and laid down, as the nature of the case required, at the beginning of one of these periods, would not be revised or reconstructed until the beginning of the next: and that one and the same type of the heavens would be considered competent to answer its purpose for 247 years to come. Every one must admit that there is nothing improbable *a priori* in this supposition; and that it would be quite in analogy with the Phœnix rule of the Egyptians: though how far it is agreeable to the actual matter of fact, we are scarcely able to say with certainty, owing to the want of the necessary information at intermediate points of time.

Mr. Bentley however has mentioned one or two facts which may enable us to form a judgment upon this question, with reference to the second of the above types at least, the revision of B. C. 699; and whether that was or was not the only type of the mansions which could have been in possession of the sphere for this second period of 247 years. He quotes an observation of an Indian author of great antiquity, Pārāsara, which is to the following effect[w]: "When the sun having reached the end of *S'ravanā* in the northern path, or half of *As'leshā* in the southern, still advances; it is a cause of great fear."

Pārāsara, according to Mr. Bentley, was contemporary with the emperor Yud-hish-t'hi-ra; who ascended the throne in B. C. 576[x]. Consequently, he was later than the second type, B. C. 699, but earlier than the third, B. C. 452. If

[w] Part i. sect. iv. 66; cf. part ii. sect. vi. 209, 210. [x] Ibid. 67.

then there was a fixed type of the sphere in his time, it must have been that of B. C. 699.

Now *S'ravanā* was the xxth mansion; and B. C. 699 it was left in longitude 256° 40′. The longitude of the xxist mansion *Dhanisht'hā* was 270 exactly: i. e. the winter solstitial point, in this second type, fell critically just between *S'ravanā* and *Dhanisht'hā*. The meaning of the observation of Pārāsara, on this principle, is very intelligible; viz. that if the sun continued to advance to the south, when it had reached the extreme limit to which it could ever attain in the natural course of things, in that direction, it would be a cause of great fear. This is called indeed advancing in the northern path; though the direction of the sun's apparent motion before the winter solstice is southward: but we apprehend this means only the path which should bring it to the north, that is to the summer solstice, which the sun can attain to only by travelling northwards. But there are two modes in which the sun, travelling previously southwards, as it must be doing, before the winter solstice, may get to the north; one by turning back, as soon as it reaches a certain point in the south, which is that of the winter solstice; another, by journeying on southwards, even after it has reached that point, and so coming to the north by making the entire circle of the heavens, and travelling constantly in the same direction. The former would be agreeable to the order of nature; the latter, contrary to it: and as Pārāsara justly observes, could such a thing happen, or seem to be likely to happen, from the sun's not turning back even at the tropic of Capricorn, it would be a cause of great fear.

In like manner, the longitude of *As'leshā*, the viith mansion, B. C. 699, was left in 83° 20′: and the summer solstice, in 90°, would necessarily be attached to the middle of that mansion: so that Pārāsara's observation would mean just the same thing of this quarter of the year, as of the opposite one; that if the summer solstice did not take place at the usual time and in the usual way; if the sun did not turn back after reaching the tropic of Cancer, and return to the south in that manner; if it should still appear disposed to travel onwards in the same direction after it had attained to the middle of As'leshā; that too would be a cause of great fear.

The same kind of remark was made by another author of the name of Garga, (a contemporary of Pārāsara's,) in his work entitled Sanhitā, which Mr. Bentley has also quoted y: "When the sun returns, not having reached *Dhanist'hā* in the northern solstice, or not having reached *As'leshā* in the southern, then let a man feel great apprehension of danger." The only difference is that this latter observation supposes the case of the sun's turning back *before* the proper time, Pārāsara's that of its not turning back *at* the proper time; but the one just as contrary to the order of nature as the other.

Both these testimonies then, as far as they go, lead to the inference that the type of B. C. 699, having been settled and laid down at that time, was still in use and undisturbed in the time of each of these astronomers, more than an hundred years afterwards *. Mr. Bentley indeed has had occasion to consider another observation of Pārāsara's in particular; re-

* These two passages, one from Pārāsara, the other from Garga, are quoted also by sir W. Jones: (Supplement to the Essay on the Indian Chronology, vol. iv. p. 59, 60.) The same statements too appear to have been referred to by the poetical astronomer, *Varáha*, surnamed *Mihira*, or the sun, from his knowledge of astronomy, (p. 50–52,) whom sir W. Jones has likewise quoted, p. 51: "Certainly the southern solstice was once in the middle of *As'lésha*, the northern in the first degree of Dhanisht'hà, by what is recorded in former *Sástras*:" i. e. the Books of Pārāsara, and other Munis, (see p. 53 of the same Essay.)

Sir W. Jones has also cited from Bhat-tót-pala, another Indian astronomical writer, (ibid. p. 53, 54,) the following passage, produced by him from the Párásari Sanhità, relating to the six Hindu seasons: each of which was coextensive with two signs, 60°, or four lunar mansions of 13° 20′ each, and one half:

"The season of *Sísira* is from the first of *Dhanisht'hà* to the middle of *Révatì*.

"That of *Vasanta* from the middle of *Révatì* to the end of *Róhinì*.

"That of *Gríshma* from the beginning of *Mrigas'iras* to the middle of *As'lésha*.

"That of *Vérshà* from the middle of *As'lésha* to the end of *Hasta*.

"That of *Sarad* from the first of *Chitrà* to the middle of *Jyesht'hà*.

"That of *Hémanta* from the middle of *Jyesht'hà* to the end of *Sravanà*."

These divisions are adapted to the type of B. C. 699, and to that alone: as may be proved by beginning with Dhanisht'hà in that, and by reckon-

y Page 66.

lating to the star Canopus (the Sirius of India): viz. That "the star *Agastya* (the Indian name for Canopus) rises heliacally when the sun enters the lunar asterism *Hastā*, and disappears or sets heliacally when the sun is in *Rohinī*[z]."

It is not clear, in our opinion, that this observation defines the precise relation of the sun to the mansion *Hastā*, when this phenomenon was usually seen to take place; that is, whether the sun had just entered *Hastā*, or had been some time in *Hastā*, and was more or less advanced in *Hastā*. It appears to us precarious to assume from it that the sun was supposed to be in the first degree of *Hastā*. *Hastā* was the

ing on 60 degrees perpetually from the first degree of Dhanisht'hà in that type.

Scheme of the Hindu divisions of the natural year, adapted to type ii of the mansions, B. C. 699.

			Seasons.
i. *Dhanisht'hà*	Long.	270° 60	Sis'ira.
ii. Middle of Révatì	—	330 60	Vasanta.
iii. End of Róhinì, or beginning of Mrigas'iras	—	30 60	Gris'hma.
iv. Middle of As'léshà ..	—	90 60	Vérshà.
v. End of Hasta, or beginning of Chitrà	—	150 60	Sarad.
vi. Middle of Jyesht'hà	—	210 60	Hémanta.
i. *Dhanisht'hà*	—	270	Sis'ira.

It appears to us a natural and an obvious consequence from these premises that the Hindus really knew of no type of the mansions, which was ever in actual use, older than this of B. C. 699: and therefore that the type of B. C. 946 was purely hypothetical; a type which never had an existence except on the principle of the *reditus retro*.

z Page 67: cf. part ii. sect. iv. 158. Cf. also Delambre, Astronomie Ancienne, i. liv. ii. ch. ii. 508, 509, who remarks (p. 509) that this observation was probably intended of a time when the solstices were falling in the middle of As'leshā, and at the beginning of Dhanisht'hā, respectively; that is exactly, as in the type of B. C. 699.

xith mansion; and B. C. 699 was left in longitude 136° 40′: but it would extend to 150°. Mr. Bentley has calculated the heliacal rising of Canopus, for the latitude of this observation, (which he assumes to have been that of *Hastina-pura*, nearly the same with that of Delhi, 28° 38′ N [a].) B. C. 576; and determined the sun's longitude at that time to 145° 10′, which would answer to 8° 30′ in the mansion *Hastā*, only 1° 50′ beyond the middle point of the mansion itself. This phenomenon therefore in the time of *Pārāsara* would undoubtedly take place when the sun was in *Hastā*, even according to the type of B. C. 699: and that appears to us to be all which can necessarily be inferred from his words, and all that is requisite to confirm or illustrate their truth.

Mr. Bentley has also recited from the astronomer Garga [b], above alluded to, the characters or criteria by which he defined and designated the proper beginning of the year, at sunrise, when he was writing his Sanhità: and these were,

The place of the sun in *Anurādhā*.
The place of the moon in *Rohinī*.
The place of Jupiter in *Pushyā*.
The place of Mercury in *S′atabhishā*.
The place of Mars in *Mulā*
The place of Venus in *Kritikā*.

And these different positions and characters, according to Mr. Bentley [b], all met on October 29, B. C. 549, on the first of *Agrahāyana*, as he supposes; the Hindu new years' day at the time.

Here however there is reason, as it appears to us, to desiderate his usual exactness. To say nothing of the positions of the planets relatively to the mansions at this time, concerning which we offer no opinion of our own, we do not see how it was possible for the sun to be in *Anurādhā* on October 29, B. C. 549, according to any type of the mansions which could have been known to Garga; in particular that of B. C. 699, of which, as we have already had reason to conclude, he must actually have made use.

Anurādhā was the xvth mansion. Its longitude in the type of B. C. 946, was 186° 40′; in that of B. C. 699, it was 190°; and in that of B. C. 452 it was 193° 20′. Its limits,

[a] P. 67–72: cf. 158–163. [b] P. 72.

B. C. 699, would be 190°—203° 20′. The longitude of the sun then in this mansion, in the type of Garga's time, could never exceed 203° 20′. But at the actual beginning of the new year, ever since the correction of B. C. 699, its longitude could never be less than 210°: a longitude, which it is easy to see could not be attained to in any mansion of the type of Garga's time, that of B. C. 699, but the xvith; the name of which at present is Jyesht'hā, but originally appears to have been Indrā. Indrā and Anurādhā were very liable to be confounded together: because, as we have seen supra[c], in the reduction of the cycle of 28 to that of 27, on the first of the principles according to which we supposed that to be done, Indrā was the mansion in the cycle of 28 absorbed at last in Anurādhā of that of 27. And Indrā being understood to be really intended in this instance, and not Anurādhā, and its longitude being assumed as the same with that of Jyesht'hā in type ii, 203° 20′—216° 40′; all would be rendered consistent; and the sun would actually be in this mansion, and might be so in longitude 210°, October 29, B. C. 549.

The further consideration of this point however may perhaps lead to an important discovery, concerning the rule of the administration of the Hindu calendar at this early period of time; and in particular whether the civil and the natural year, having once been adjusted to each other on certain principles, at the beginning of one of these periods of 247 years, were ever *de facto* readjusted and remodelled, in conformity to the same principles, before the beginning of the next. At the last correction, B. C. 699, the head of the calendar was left attached to October 29; and this was the Julian date of the 1st of Agrahāyana (or Mārgas'irsha) at that time. By rule too it must have been the date of the ingress of the sun into Scorpio. Between B. C. 699 and B. C. 549 the interval would be 150 years; in which time the ingress of the sun would fall back at least one day, from October 29 to October 28. The question is, Did the first of Agrahāyana fall back with it too; or did it continue attached to October 29?

c Page 57.

On this question, the lunar character of the new year's day, B.C. 549, specified by Garga, is the most critical and important. The moon was in Rohinī, and at sunrise, on that day. Rohinī was the second mansion. Its longitude, B. C. 699, was left circumscribed by 16° 40′ and 30°. Let us suppose the sun in the middle of Jyesht'hā = Indrā, or 210°: the moon in the last degree of Rohinī, 30°. Its elongation from the sun must have been 180°; that is, it must have been in opposition; and therefore at the full. Now, it appears from Pingré, that there was a lunar eclipse Nov. 28 at 11.30 P. M. for the meridian of Paris, B. C. 549. Consequently a mean full moon, October 30, 10 h. 46 m. for the same meridian: and 4 h. 54 m. later for that of Ujein in India [d]. The true full moon, corresponding to this, must have fallen out some time Oct. 30 too. The moon therefore must have actually attained the elongation of 180°, Oct. 30. But as it could do this only in the last degree of Rohinī, and it is supposed to have been in Rohinī at sunrise, it is manifest it must have been in Rohinī between sunrise Oct. 30, and sunrise the day before, Oct. 29; i. e. if it was in the last degree of Rohinī at a given time Oct. 30, it must have been in the first degree at the same time Oct. 29. On this principle, by the lunar character of the new year's day, B. C. 549, Garga must have meant either Oct. 30 at sunrise, or Oct. 29 at sunrise. He could not have meant Oct. 30, because that was never the new year's day, neither in type ii nor in type iii. He must therefore have meant Oct. 29. And this being called the first of Agrahāyana still, it is evident that the first of Agrahāyana was still continuing attached to the same Julian date to which it had been left attached, B. C. 699: it had not fallen back in the mean time, along with the ingress of the sun into Scorpio, from Oct. 29 to Oct. 28. We must conclude then that the civil year, having been once adjusted to the natural, at the beginning of a period of 247 years, (at this remote point of time at least,) was supposed to preserve the same relation to it for the whole duration of the period itself. And this being the case even with the civil year, it may well be taken for granted that the scheme of the mansions, having been once

[d] Hindu Astronomy, part ii. sect. i. p. 111.

defined and laid down, at the beginning of one of these periods, was considered to have been fixed for the whole of that period at least.

SECTION XI.—*On the change made in the mansions, at the epoch of type vii; or on the sidereal mansions of the Hindu sphere, and the principle according to which they were determined.*

The interval from B. C. 847 to A. D. 538 amounted to 1384 years; in which precession, according to our tables, would accumulate to 19° 14′ 56″·244. Hence, B. C. 847,

Longitude of the xxviii mansion, type i = Kṛitikā in the Hindu scheme ..	1°	3′	3″·827
Precession, 1384 years	19	14	56·244
A. D. 538, longitude	20	18	0·071

The longitude of Kṛitikā at the epoch of type vii of the Hindu mansions, A. D. 538, according to the rate of precession assumed and observed, virtually from B. C. 946 and actually from B. C. 699, must be found in 3° 20′ × 6 or 20° exactly: and this differs so little from the above, that both may be considered as nearly the same. In this case, it will be evident that the xxviiith mansion in the original type of the mansions among the Egyptians, and the first in the Hindu modification of the Egyptian, which began to proceed together in a state of coincidence, B. C. 699, must have proceeded together, without any essential difference in that state of relation to each other, down to A. D. 538; the epoch of a new æra in astronomy among the Hindus, according to Mr. Bentley, and of a total change in their astronomical and in their chronological system.

With the nature or with the particulars of this change we are not concerned ourselves at present; except so far as it affected the mansions. And it is observable of this year, A. D. 538, that it is also the date of the introduction of the sidereal mansions into the Hindu sphere, in contradistinction to the simply lunar, which hitherto had been the only ones in use among them. Not that the lunar were laid aside at this time; but that the sidereal were brought into use, as well as the lunar: and that from this time both have been in use

together, and both have been in possession of the sphere at once. The names of the lunar mansions too were retained for those of the sidereal. But in the preexisting order of the lunar a change was made; and the last but one in the order of the lunar, as we have already mentioned, was made the first in the order of the sidereal.

The mode of the derivation of the sidereal mansions from the lunar, and the changes which were made in the latter for that purpose, may easily be explained and rendered intelligible.

i. At the epoch of the viith revision, A. D. 538, the longitude of Kritikā, according to rule, was observed to be 20° 0′ 0″: and that of Bharanī, the mansion immediately before it, to be 6° 40′; that of Aswinī, next before Bharanī, to be 353° 20′. The first thing done was to change the order of these mansions *inter se;* that is, to assume Aswinī as the first, Bharanī as the second, Kritikā as the third—and so on with the rest; by which means Revatī, before the last but two, became the last, as it has always been since in the sidereal mansions of the Hindus. No change having yet been made in the longitudes of the mansions, when this change was made in their order; the first mansion, Aswinī, in this new arrangement, was still standing in longitude 353° 20′: Bharanī, the second, in longitude 6° 40′: Kritikā, the third, in longitude 20°, as before.

ii. The next thing done then was to advance every mansion 6° 40′ on the sphere, at once: and consequently Aswinī from 353° 20′ to 360° or 0° 0′ 0″*: Bharanī from 6° 40′ to 13° 20′: Kritikā from 20° to 26° 40′: and so on down to Revatī, which was thus left standing in 346° 40′, instead of 340°, as it was before. And these two things having been done; that is, the beginning of the mansions having been changed from Kritikā to Aswinī, and the longitude of every mansion increased 6° 40′; it is evident that type vii, coming into ex-

* This explains an observation of Mr. Bentley's, p. 98, that A. D. 538, the month Vaisākha was found to be coinciding with the lunar asterism Aswinī. In fact, the sun would enter Aswinī six days before the first of Vaisākha; but the addition of 6° 40′ to its longitude, 353° 20′, brought it up to 360°, or 0° 0′ 0″, and so to a state of coincidence with the ingress into Vaisākha.

istence A. D. 538 in this form, was to all intents and purposes, (in every thing except the nominal order and succession of the mansions,) a revival and republication of type i, of the epoch of B. C. 946 itself: as any one may see from the comparison of the two together, as they both stand in our synopsis.

iii. The next step in the process was to find a star, which was standing on the ecliptic, or as near to the ecliptic as might be, and in the very first or in the very last degree of the ecliptic, A. D. 538; in order to serve as the zero or point of 0, to the succession of mansions, and to the longitudes of each: which were all to be reckoned from this star, and from the degree or point of the sphere which it was occupying at the time. The zero or point, so chosen and under such circumstances even for these mansions, it is manifest would be the true zero or point of $0^\circ\ 0'\ 0''$ on the sphere itself, at the time; the epoch of mean longitudes absolutely; the intersection of the ecliptic and the equator.

The first degree of the ecliptic, A. D. 538, was falling in Pisces; and in the 17° or 18° of Pisces. There were various stars, situated in or near to the ecliptic, in this sign; but that which the Hindu astronomers fixed upon was ζ Piscium, the nearest to the ecliptic of all, though not situated actually on it: the characters of which, according to Flamsteed, at the end of A. D. 1689[e], were $0^s\ 15^\circ\ 32'\ 13''$ E. long., and $0^\circ\ 13'\ 25''$ S. lat. This star is called by the Hindus Revatī[f]; and Revatī is also the name of the last of their sidereal mansions; the xxvth of the lunar or tropical. There is no reason to suppose that this mansion derived its name from the star. It must have been called Revatī long before any such star could have been falling in it. But the star might very naturally take its name from the mansion, in which it was both found to be falling at this time, and intended to fall ever after.

iv. This star ζ Piscium then, standing at the time in the intersection of the tropical and of the sidereal sphere, in the true zero or epoch of the longitudes of the fixed stars themselves, having been pitched upon as the point of the

e Catalogus Britannicus, p. 22. Opp. iii.

f Delambre, Astronomie Ancienne, i. Liv. ii. ch. ii. 502.

sphere from which the graduation of the mansions should begin, and should proceed all round the sphere; there was no necessity to lay down the mansions themselves on the sphere afresh. That had been already done in type i, which was now again coming into use, so much later than its own date B.C. 946. Nothing was necessary except to mark what stars were falling within the limits of these mansions of type i; that is, within every 13° 20′ of space on the ecliptic, all round the sphere; and in what part of each mansion, and at what distance from ζ Piscium, on the ecliptic, respectively. The first of these things so ascertained was set down as the longitude of the star in its own mansion: and the other similarly determined as its longitude on the sphere. And it must be evident, from the nature of the case, that, unless the fixed stars have each a proper motion of their own, and are liable to change their places by virtue of that motion of their own, both absolutely with respect to space, and relatively with respect to each other; the place of a star, in its own mansion, once defined, and its distance from ζ Piscium, or the common epoch of the longitudes of all, once laid down in this manner, they must remain ever after the same; they could not be considered liable to vary, relatively to each other at least. That even the fixed stars have proper motions, which are liable in the course of time to change their position in space, both absolutely and relatively to one another, astronomers at present are agreed: but it may very well be doubted whether the Hindu astronomers of this time were aware of that fact; and did not rather take it for granted that the places of the fixed stars, having been once defined with the necessary degree of exactness, might be assumed as ever after invariable and the same.

On these principles were the sidereal mansions of the Hindus determined and laid down at the epoch of the seventh type of the sphere, A. D. 538. What has thus been said may suffice to give the reader a general idea of the process; and of what must be understood by these sidereal mansions in contradistinction to the lunar or tropical. For more particular information we must refer them to Mr. Bentley, to Delambre, and to the writers in the Asiatic

Researches; who have treated expressly of such subjects as these, and have gone into all their details.

Though these sidereal mansions however might be considered and called immoveable, in comparison of the lunar or tropical; it is manifest that they could be so only relatively to one another, and to the common point or zero of the sphere from which they were all graduated alike. They must be subject to the effect of precession, just as much as the stars within them. The tropical points of the sphere, in particular the vernal equinoctial point, from which the lunar mansions were dated perpetually, receding constantly on the ecliptic; the longitude of ζ Piscium, the common epoch of the sidereal mansions, from that point, must become greater and greater annually. The sidereal mansions in short, though taking their rise A. D. 538 from the same point of the sphere as the lunar themselves, must exhibit the phenomenon, from that time forward, of a gradual advance in the order of the lunar, though they could never change their places or distances relatively to one another; and the annual rate of that advance must be that of the increment in mean longitude of the fixed stars, annually produced by precession; which, as we have assumed it, is 50″·069 541. This effect has been going on from A. D. 538 forward; and in 1264 years, the interval from A. D. 538 to A. D. 1802, it would amount to 17° 34′ 47″·899: so that every one of the sidereal mansions of the Hindus, A. D. 1802, would be 17° 34′ 48″ in advance of its place on the sphere in A. D. 538.

It is easy therefore to verify this scheme of A. D. 538 by a comparison with the heavens at any intermediate point of time. And in order to facilitate that comparison, in this particular year, A. D. 1802, we have annexed to our synopsis the longitudes of the mansions of type vii in A. D. 1802, corresponding to those of the same mansions in A. D. 538: the difference in each instance being this quantity 17° 34′ 47″·899, the amount of the precession between A. D. 538 and A. D. 1802. If their longitudes were correctly laid down in A. D. 538, and if the rate of precession which we assume in our Tables is not materially in error; these should be their longitudes in A. D. 1802: and it is easy to reduce that question to the test of the matter of fact.

The longitudes of these mansions in each instance being exactly proportional to those of the stars laid down within them; and the one having always been affected by precession in the same way and at the same rate as the other; it is indifferent to the result, whether we apply the test to the mansions or to the stars contained in them. Mr. Bentley has given a list of the stars[g] supposed to have been fixed upon in each instance in A. D. 538, when the mansions were laid down; shewing likewise the longitude assigned to each in its proper mansion at the time, and the correction required in some of these cases to reduce that to the true. From these we will select one or two examples, as specimens of the rest.

As i.[g] The first star of Aswinī, the first mansion, is assumed to have been γ or β Arietis. Its longitude in its own mansion was 8°: its true longitude, referred to ζ Piscium, was 12° 5.

A. D. 538 longitude of γ or β Arietis, in 8° of mansion i,	12° 5′ 0″
Precession, 1264 years.	17 34 48
Longitude, A. D. 1802.	29 39 48

And this is about the actual longitude of γ Arietis, the first star of Aries, A.D. 1802.

ii. The principal star of Maghā the xth mansion was Cor Leonis, or Regulus: its longitude, in its own mansion, was 9°: its true longitude, from ζ Piscium, was 129°.

A. D. 538 longitude of Cor Leonis in 9° of the xth mansion	129° 0′ 0″
Precession, 1264 years	17 34 48
Longitude, A. D. 1802.	146 34 48

And this too is nearly correct for the mean longitude of Regulus, A. D. 1802.

iii. The principal star of Chitrā, the xiith mansion, was Spica Virginis; its longitude in its own mansion was 9° 40′: its true, 183° 49′.

A. D. 538 longitude of Spica Virginis, in 9° 40′ of mansion xii	183° 49′ 0″
Precession, 1264 years	17 34 48
Longitude A. D. 1802	201 23 48

g Part ii. sect. i. 100. cf. Delambre, i. 503 sqq.

Which also will be seen to be as nearly as possible correct for the longitude of Spica Virginis at that time.

iv. Lastly, the principal star of Revatī was of course ζ Piscium. Its longitude in its own mansion was 13° 20′, that is, the very end of the mansion, and the very end of the sphere too. Its true longitude therefore was 360°, or 0° 0′ 0″. The increment in the longitude of this star or of this mansion consequently, from A. D. 538 to A. D. 1802, is the most exact measure of the actual amount of that increment in this interval of time which could be applied.

A. D. 538, longitude of ζ Piscium in 13° 20′ of mansion xxvii	0°	0′	0″
Precession, 1264 years	17	34	48
A. D. 1802, longitude	17	34	48
Longitude in 1800, according to Delambre[h] ..	17	5	
Difference		29	48
Subtract 2 years' precession		1	40
Difference 1802		28	8

i. e. almost the same as the difference A. D. 538 between the mean longitude of our tables and that of the Hindu astronomers, which was then 18′ exactly.

SECTION XII.—*On the date assigned by the Hindus to the pretended incarnation of Krishna,* A. D. 600; *and on the planetary cycle of the Hindus.*

It appears from Mr. Bentley[i] that towards the end of the sixth century of the Christian æra, when Christianity was making considerable progress in India, the Brahmins, alarmed at its success and desiring to impede its reception among the people, (at least as any thing different from their own system of religion,) invented the fable of the Incarnation or Avatar (i. e. descent) of Krishna,—a name evidently borrowed from that of our Saviour, Jesus Christ. And Mr. Bentley, having obtained access to the *Janampatra* or horoscope of Krishna, was enabled to discover from it that he was supposed to have been born on the 23d of the moon of Śrāvana, in the lunar mansion Rohinī, at midnight; the positions of the five planets also, Saturn, Jupiter, Mars,

[h] Astronomie Ancienne, i. liv. ii. ch. ii. 502. [i] Part ii. sect. i. p. 109–114.

Venus, and Mercury, at the same time, being assigned, as well as those of the sun and of the moon[k]: from all which together Mr. Bentley collected the true Julian date of the pretended nativity in question to be August 7 A. D. 600.

There was a lunar eclipse, B. C. 600, Sept. 28. 9 h. 30 m. A. M. for the meridian of Paris: and therefore a mean new moon, July 16. 13h. 40m. which would be July 16. 18h. 34m. for the meridian of Ujein in India, 4h. 54m. east of Paris[l]. The mean 23d day of this moon would bear date August 7 at 18 hours also; but according to Mr. Bentley, the true 23d was reckoned at 18 minutes past one in the morning the same day. The other criteria of the date meeting in Aug. 7. we may rest satisfied about its truth.

In Mr. Bentley's opinion, Krishna himself, as an emanation or portion of Vishnu, was only another of the Hindu personifications of Time. His figure was almost always accompanied with some of the emblems of time; and he was made to say of himself in answer to a question concerning his origin and his essence[m], "I am Time, the destroyer of mankind, matured; come hither to seize at once on all these who stand before us."

Now this date of his birth, August 7, is remarkable. The reader will recognise in it the Natale Mundi of the Babylonians, and of the Egyptian astrologers of B. C. 798; for though that was properly August 8, it is to be considered that B. C. 798 was leap-year in the Sothiacal cycle of that kind, and A. D. 600 was the year after leap-year; and August 7 in the common years of the Sothiacal cycle would be just the same thing as August 8 in the leap-year of the cycle. This Natale Mundi, from the necessity of the case, must have a double Julian date, August 8 in the leap-years August 7 in the common years of its proper cycle.

Why then, we may ask, did the Brahmins of India fix upon this date for that of the incarnation of Time, under the name of Krishna; except from a knowledge of this astrological notion relating to the Natale Mundi, or beginning of time itself, on August 8 or 7? It is observable also that

[k] P. 110, 111. The 23d luna of Srávana is still marked in the Hindu calendar, as the date of the birth of Krishna. See sir W. Jones' Works, vol. iv. supra. Its name is Crishnajanmashtāmi, the 8th day of the second half-month of Srávana.

[l] P. 111. [m] P. 112.

A. D. 600, when the Dom. Lett. were CB, August 7 was the *feria prima* or Sunday; and Time on this principle was born in his person on the feria prima of the hebdomadal cycle. No doubt there was a meaning in all these suppositions; which in our opinion is best and most satisfactorily explained by the knowledge of the tradition and of the doctrine to which we have alluded. Our readers however will think as they please about them.

We will conclude this account of the Hindu mansions with one more remark. The planetary cycle in conjunction with the hebdomadal is common to the Hindus as well as to the Chinese; and we have no doubt that they too derived it from the Egyptians, and consequently not before B. C. 798. They might have, and probably had, the hebdomadal cycle among them, from the first; but the planetary cycle in connection with it they could not have before B. C. 798; nor very probably so soon as that year. We have shewn elsewhere[n] that though their hebdomadal cycle is reckoned from the feria prima, according to its proper rule from the first, the planetary cycle is reckoned from the feria sexta; or, as it may be otherwise expressed, as the Egyptian planetary cycle, in conjunction with the hebdomadal, began with Saturn, and the Chinese began with Jupiter, so did the Hindu one begin with Venus; in which respect it resembled the Arabian, of which the same fact holds good. Venus was consequently the principal planet in the Hindu planetary cycle, as Saturn was in the Egyptian, and Jupiter in the Chinese.

Now the most probable explanation of this fact too is that when the Hindus received the mansions from the Egyptians, B. C. 699, they received the planetary cycle also; and as they carried back the mansions from B. C. 699 to B. C. 946, so they carried back the planetary cycle too. If however they did that, and went back for that purpose from the proper epoch of the cycle August 8, the middle decad of Leonton, B. C. 798, they would find Venus in the ascendant, in the first decad of Scorpion, on October 25 B. C. 946. For the interval from B. C. 798 to B. C. 946 was just 148 years; in which there would be four cycles of 36 years, and four years more of a fifth. It is easy to calculate therefore that

n Diss. vi. ch. ii. sect. i. iii. vol. i. 407.

Saturn's place, B. C. 946, reckoned back from August 8 B. C. 798 the middle decad of Leonton, would be the second day of the last decad of Parthenon, Sept. 14, the feria 7[a]; and that of Venus, the third day of the first decad of Scorpion, October 25, the feria sexta.

We have already had occasion to shew that October 24 B. C. 946 was the feria 5[a]: and that fact was attested by the Hindu fable relating to the birth of their goddess *Srī*, who, as being born of the sea, might be the Hindu Venus herself. It could therefore hardly be unknown to the Hindus, even in B. C. 699, that October 25, B. C. 946, at the epoch of their lunæsolar correction, was the feria sexta; and that the first day of the first decad of Scorpion, that year, was almost the feria sexta too. It is observable that B. C. 699 itself the mansion Mulā, which was properly the head of the reckoning of the mansions, was falling on October 27, as our general synopsis shews; consequently only two days before the first of Agrahāyana, the new year's day at the epoch of the second period of 247 years, October 29. It is possible that October 27 at this very time, and on account of the recent miracle of B. C. 710, would be reckoned from Oct. 26 at 6 A. M.: and if so, B. C. 699, when the Dom. Lett. was G. Oct. 26 also was Friday. The mansions, in the Hindu calendar, would thus set out with Mulā attached to the feria sexta B. C. 699: and even as carried back to B. C. 946 they would still have set out with Mulā attached to some date in October very near the 25th*. These coincidences were probably the reasons which determined the rule of the planetary cycle of the Hindus, and induced them to assume the *feria sexta* and the planet Venus as the epoch, in preference to any other *feria* and to any other planet.

* The precession of the mean sidereal on the mean Julian year, in 401 years, the interval from B. C. 1347 to B. C. 946, amounted to 2 days, 7 hours, and upwards. So that if the sidereal date of our xvith mansion = Mulā in the Hindu scheme, B. C. 1347, was Oct. 24, B. C. 946 it must have been Oct. 26.

CHAPTER XIII.

On the observations of solar and lunar eclipses attributed to the Egyptians, and on the time when they began to be instituted.

SECTION I.—*On the Chaldaïc Sarus or ecliptic period of 223 lunations.*

THE ecliptic period of 223 lunations, 6585 mean solar days and nearly one third of another, is commonly called the Chaldaïc Sarus; and that implies that it must be generally supposed to have been first discovered and first applied to its proper use and purpose by the Chaldæans of ancient time. We have no desire to question the truth of any opinion of this kind merely from the love of novelty or the affectation of singularity; but as we have been obliged in the prosecution of our own work to inquire into the grounds of this belief, the truth compels us to say we have not been able to discover any sufficient foundation for it.

This period is noticed by Ptolemy [p]; but he does not call it the Sarus, nor does he expressly attribute it to the Chaldæans. The period in its simple and original state, which is in fact its true state, consisted of 6585 days and a fraction of one more; but this fraction not being convenient for calculation, the period was some time or other tripled, and made one of 19756 mean solar days complete. In this shape it was called the ἐξελιγμὸς, or something which in Greek might be rendered by ἐξελιγμός: and in this shape, and under this name, we freely admit that from the tenor of Ptolemy's account of it he might have supposed it to be the work of the Chaldæans. It stands to reason however that there must have been some interval of time between the discovery of the simple period and this modification of it in the form of the ἐξελιγμός; and equally so that those who discovered the simple period could not have been those who modified it first in this way. And this very natural presumption of the actual order and course of the event appears to be confirmed by the language of Ptolemy; who evidently supposes

[p] Magna Compositio, iv. cap. ii. 214–216.

the period in question from first to last the joint work of two races of astronomers, one of which he calls *παλαιοὶ*, and the other *οἱ ἔτι παλαιότεροι*[q]. The former might be the Chaldees, old in comparison of himself and of Hipparchus, even though their antiquity went no further back than B. C. 746 or 747. The latter must have been a still older race, and therefore distinct from them.

The modification of the simple period, thus called by the Greeks the *ἐξελιγμὸς*, but not the simple period of the 223 lunations merely, is mentioned by Geminus also; and it is principally from his account of this *ἐξελιγμὸς* that learned men have been induced to ascribe the discovery of the Sarus itself to the Chaldæans. We have had occasion to notice the standard of the mean lunar diurnal movement in longitude assumed by the Chaldæans[r]; and we learnt from Geminus that the Chaldæans deduced it from this period of the *ἐξελιγμός*: from which it appears only a natural inference that they were the authors of the *ἐξελιγμὸς* itself. And this may be conceded as probably no more than the truth; and still it will not follow from it that they were the discoverers of the simple period: but rather quite the contrary, that if the Chaldees were the authors of the modification of the simple period, not they, but some others, whosoever they were, must have been the discoverers of the simple period.

This period is mentioned by Pliny the elder also[s]: Defectus (lunæ) ducentis viginti tribus mensibus redire in orbes suos certum est: in which numbers there is a various reading of 222, though 223 only can be the true; for the period itself is one of 223 months, not 222. There is no mention of the Sarus in this allusion, nor any ascription of the discovery of the period to the Chaldees. Censorinus has not noticed the period at all. In short we find no testimony to connect its name with the Sarus, or its discovery with the Chaldæans, before the time of Suidas; which is much too late for the decision of a question of such antiquity as this. *Σάροι· μέτρον καὶ ἀριθμὸς παρὰ Χαλδαίοις. οἱ γὰρ ρκʹ σάροι ποιοῦσιν ἐνιαυτοὺς ͵βσκβʹ* (2222) *κατὰ τὴν τῶν Χαλδαίων ψῆφον, εἴπερ ὁ σάρος ποιεῖ μῆνας σεληνιακοὺς σκβʹ οἳ γίνονται ιηʹ ἐνιαυτοὶ καὶ μῆνες ἕξ.*

[q] Cap. ii. 214, ad princip. and 225. Geminus, cap. xv. Uranologium, 62 A—E.
[r] Chap. ix. sect. vi. vol. iii. 522. Cf. [s] H. N. ii. 10.

There is great confusion of ideas in these words. The ecliptic period, which must be understood to be meant by the Sarus as a cycle of eclipses, is undoubtedly one of 223 lunar months, not 222. In days it is a period of 6585 mean solar days, and seven or eight hours of one more; in Julian years it is a period of 18 years, and 10 or 11 days of another, as there are five leap-years in these 18 years or only four. It is not true that 120 times 222 months are equal to 2222 years; since they make up only 26640 months, and 2220 years of 12 months each. In like manner, 18 y. 6 m. × by 120, equal 2220 years, but not 2222.

It is manifest therefore that no authority can be attributed to such a statement as this. There was indeed a stated connection in Chaldaïc chronology between the Sarus in its proper sense and this factor or multiplier 120: 120 times the Sarus, in its proper sense of the period of 3600 years, did really constitute a great Chaldaïc period of 432 000 years; as every one must know who has read the fragments of Berosus: and it is not improbable that in the preceding passage these things have been confounded, the proper lunar period of 223 lunations, the proper Chaldaïc Sarus, and this factor of 120.

Some of the learned have sought for the origin of this name of the Sarus in the supposed Chaldaïc term for the moon, *Sihara* or *Schehr*; but this kind of reasoning about the meaning of things from names is very ambiguous and very ambidexter in its application; and others on the very same principle have derived the name from a very similar Chaldaïc word denoting *Restitution*. There is more reason for this latter derivation *a priori* than for the former; which appears to us to be founded at bottom on the prejudice of such long standing, that the proper name of this ecliptic period from the first was the Sarus, and therefore that it must have been borrowed from the moon. We cannot perceive any great resemblance between *Sihara* or *Schehr*, and Sarus. Sarus itself is Greek, Σάρος: and Σάρος is only the Greek form of an oriental term, which in its own language must have been Σαρ or something like it: and it would seem to be much more natural to search for the root of the word in the Chaldaïc numeral for ten, than in the Chaldaïc name for the moon—for the number ten was

ultimately the base of the Sarus itself, and the word in the Chaldee for the number ten is Asara[t], not very unlike to Sar.

The Sarus was only one of three periods peculiar to the Chaldees, the Sossus, the Nerus, and the Sarus[u]: and these were related to each other by a community of nature. If any one of them was a lunar period, the other two must have been so too. They were related too, as the numbers 60, 600, and 3600. It may be very well demanded, if the Sarus was the proper name of the ecliptic period of 223 lunations, of what was the Nerus, and of what was the Sossus, the name? and in what manner can the relation of 60, 600, and 3600 be established among them, all being proper names of a particular lunar period alike?

In a word, if this ecliptic period was really discovered by the Chaldees, and they were actually the first to apply it to its proper use; we do not see what foundation there could have been for the statement which occurs in Diodorus[x], that, though the Chaldæans understood the theory of lunar eclipses, they knew so little of that of solar, or were so distrustful of what they knew, that they durst not venture to calculate or to predict them: Περὶ δὲ τῆς κατὰ τὸν ἥλιον ἐκλείψεως ἀσθενεστάτας ἀποδείξεις φέροντες οὐ τολμῶσι προλέγειν οὐδ' ἀκριβῶς ὑπὲρ αὐτῆς περιγράφειν τοὺς χρόνους. The principle of the Sarus is just as applicable to one as to the other. Those who really first enucleated this period for themselves must have known quite as much of one as of the other. The distinction implied by Diodorus holds good of the Chaldæans in point of fact, whatsoever was the reason of it; viz. that they had abundance of lunar observations of this kind, but no solar ones: and, as we have more than once observed, the state of the case was just the reverse among the Chinese, who had abundance of solar eclipses to shew, but no lunar: and the truth of either of these facts is so far a voucher for that of the other.

SECTION II.—*On the probable explanation of the three Chaldaic periods: the Sossus, Nerus, and Sarus.*

There can be no doubt however that, whether rightly or

t See Masclef, Grammatica Chaldaïca, vol. ii. cap. ii. num. v. p. 27.

u Cf. Syncellus, i. 30. 6 sqq.: 58. 4 sqq.

x ii. 31.

wrongly so called, this ecliptic period of 223 lunations must have derived the name which has been given it from that of the Sarus, as one of the three periods which have just been mentioned—the Sossus, the Nerus, and the Sarus. The third of these periods must have given its name to this ecliptic period; and not, *vice versa*, have borrowed its own name from that. If then we can point out in a few words the probable origin of these three periods among the Chaldæans, the relation in which they stood to each other, and to something else to which they were all referred in common, and the principle on which this relation was determined; and if we can shew that in none of these periods was there the least reference originally to the moon, or to this ecliptic cycle; we shall do much to convince our readers that this ecliptic period could never have been connected with the Sarus, not even in name, except metaphorically: and we shall prepare the way for the inference deducible from that fact, that a period like this, which has nothing but its name to refer it to the Chaldees, and that too a name which could not properly have belonged to it, was not of their discovering. At least it must be precarious and gratuitous, merely on the strength of the name, to ascribe its discovery to the Chaldæans.

The true length of the mean sidereal day is 23 h. 56 m. 4 s ·090 571 217 6 of mean time [y]: and the true amount of the diurnal acceleration of the fixed stars, or of the diurnal anticipation of mean sidereal on mean solar time, is 3 m. 55 s ·909 428 782 4. And this is sufficient to shew that the anticipation in reality cannot be exactly determined; i. e. without including a fractional part of the mean solar second at last; but that as it approaches very nearly to 3 m. 56 s., so it might be cyclically assumed at 3 m. 56 s.: or even reckoned to be so, from a very possible and excusable misapprehension of the truth. The most accurate modern astronomers, when not speaking with a professed regard to exactness, may be found so to assume it.

The diurnal anticipation however being assumed at 3 m. 56 s. of mean solar time, it follows that the length of the mean sidereal day is just 3 m. 56 s. less than that of the mean solar

[y] See the Introduction to the Tables, part iii. ch. i.

day; i. e. it is 23 h. 56 m. 4 s. of mean solar time in length. Now, were this the true length of the mean sidereal day in terms of the mean solar, then this consequence would result from it; viz. That one equable year of 365 mean solar days would contain 366 mean sidereal days, within 24 seconds of mean time only: for 3 m. 56 s. × 365 = 23 h. 55 m. 40 s.: and that is only 24 seconds less than 23 h. 56 m. 4 s. It follows on this principle, that 365 mean solar days would anticipate on 366 mean sidereal days by 24 seconds of mean time: and it is easy to calculate that in 60 years of 365 days this anticipation would amount to 24 minutes of mean solar time; i. e. to a sixtieth part of one day; in 600 years to four hours of mean solar time, i. e. to the sixth part of a mean solar day; and in 3600 years, to 24 hours of mean solar time, i. e. to one mean solar day exactly. Mean solar time, and mean sidereal time, would thus return to their original relations to each other, within *one* day, in 3600 years of 365 days each. And allowance being made for that difference, every thing would begin and proceed in the relation of these two kinds of time to each other, at the end of this period of 3600 equable years, as it had done at the beginning.

Now no one can deny that while the primitive equable year was still the only one in use, from the moment that the system of judicial astrology came to be invented, and every day and every part of a day, in mean solar time, was fatally and indissolubly connected with sidereal through the stars; a relation like this between mean solar time and mean sidereal time, once discovered, and once supposed to hold good, would be considered of infinite importance; and would be supposed to furnish the necessary datum for adjusting the course and succession of mean solar time to that of sidereal, or *vice versa*, for any length of time either backwards or forwards, with the utmost certainty and precision. And an assumption like this, so useful to such a system, and so indispensable to its practical application, was no where so likely to be taken for granted, if there was any foundation for it, and to be acted upon, as in Chaldæa, and among the Chaldees, the authors of the system of judicial astrology itself.

Now these several periods, (the first, one of 60 years, in which the anticipation of mean solar on mean sidereal time

would thus amount to 24 minutes of mean solar time; the second, one of 600 years, in which it would accumulate to four hours of mean solar time; and the third, one of 3600 years, in which it would amount to an entire solar day,) as we have already observed, are the periods which have been handed down to us from antiquity, as peculiar to the Chaldees, under the name of the Sossus, which answers to the first; that of the Nerus, which answers to the second; and that of the Sarus, which corresponds to the third. Was it accident or design which produced such a coincidence in the very birthplace of judicial astrology; and where, above all places, the relations of mean solar and of mean sidereal time to each other must have been most studied and observed? Our readers will judge for themselves. We have no hesitation in declaring it to be our own opinion that it was altogether the effect of design; and founded on that view of the restitution of mean solar and of mean sidereal time one to the other, both in the parts and also in the wholes, which has just been pointed out: and consequently, though doubts have been raised by some of the learned on this point, that these periods were always intended of years and of equable years, never of days or of months.

It is self-evident that each of these numbers, 60, 600, and 3600, is a multiple of 6, and also a multiple of 10: and that the factors into which the first admits of being resolved are 10 and 6; those into which the second does so are 60 and 10; and those into which the third does so, are 600 and 6: so that 6 or 10, or both, must have entered into each of these numbers alike. Not that they were so obtained in the first instance, in any of these cases, by assuming 6 and 10 and multiplying them together; but simply from the relation of mean solar to mean sidereal time, and from the recession of the one in terms of the other, for an integral part of the mean solar day, and up to one such day entire. Yet both 10 and 6 were important terms in themselves in such a system as the Chaldaïc. We have ourselves illustrated the preference which they gave to the former in the graduation of their proper sphere[z]; and Censorinus has partially explained what use they made of the latter[a]: while as to the product of the two,

z Supra, ch. viii. sect. iv. vol. iii. 468.

a De Die Natali, viii.

60, Plutarch designates it Τῶν μέτρων (τὸ) πρῶτον, τοῖς περὶ τὰ οὐράνια πραγματευομένοις in general [b].

We must not omit to observe, in reference to this point, that, if the preceding explanation of the origin and first conception of these peculiar Chaldaïc periods is correct, it is demonstrative of the fact that the distinction of mean solar time, in opposition to solar of any other denomination, must have been known to the Chaldees before these periods were invented; and that was probably at the epoch of their sphere, and of their whole system of judicial astrology itself, B. C. 1106. These periods are founded on the relation of mean solar time to mean sidereal time, and *vice versa:* and this restitution of time of one kind to time of the other, in the parts and in the totals, holds good only of mean solar time in reference to mean sidereal, and *vice versa.*

Let it also be impressed on the notice of the reader, that the difference between the two forms of mean time, on the principle in question, begins with being 24 seconds of mean solar time at the end of one year; and amounts to 24 minutes of mean solar time at the end of 60 years: and proceeds ever after at the rate of 24 minutes every 60 years, first up to four hours of mean solar time, or 24 m. × 10, in 600 years, and at last to 24 hours of mean solar time, or 24 m. × 60, in 3600 years.

Now this leads us at once to the sexagesimal division of the period of 24 hours of mean solar time; which is confessedly of great antiquity *: and to the quarter of the world too, in which it must first have been excogitated and brought into use. The nature of this division was such that the νυχθήμερον or period of 24 hours of mean solar time was first of all distributed into 60 equal parts, each of which would contain 24 minutes of mean solar time; and these were called πρῶτα or firsts: each of these firsts was then subdivided into 60 equal parts, each of them containing 24

* It is still to be met with every where in the east, among the Chinese, Hindus, Siamese, Tatars, Persians, and the rest: and it appears to have been in use among them from time immemorial. See Bailly: Histoire de l'Astronomie Ancienne: Liv. iii. sect. ix. p. 70. iv. § xiv. p. 110. Éclaircissemens, ix. § vi. p. 476. Histoire d'Astronomie Indienne, Discours Préliminaire, p. xiii.

[b] De Iside et Osiride, lxxv.

seconds of mean time, and called δεύτερα or seconds: and then each of these seconds was divided into sixty equal parts called τρίτα or thirds, each of them containing 24 thirds of mean solar time: and so on to any extent. No one requires to be told that this was actually a common, (almost the only,) mode of dividing the period of 24 hours among the ancients: and that it is necessary to understand it still in order to reduce their divisions of that kind to our own. Yet it is not necessarily older than the division of the νυχθήμερον itself into 24 hours. On the contrary, if it was suggested in the manner which we have just explained, it must have been founded upon that; and therefore must presuppose it.

We meet too, on various occasions, among the nations of antiquity, with this number 24, as the divisor of certain subjects into a corresponding number of parts [c]; under circumstances in which the adoption of such a number would appear singular, and not such as we might have expected *a priori* to meet with, unless there had been a decided preference of it, founded on such a reason as that of its being previously the recognised basis of an universal division of noctidiurnal time.

Section III.—*On the Egyptian origin of the ecliptic Sarus.*

The right of the Chaldæans to the original discovery of this peculiar lunar period being thus liable to be called in question, there is no nation of antiquity to which this discovery can be ascribed so probably as to the Egyptians; from whose school every discovery of this kind appears to have emanated; even those which, though borrowed from them in the first instance, were modified or improved by their neighbours for themselves. The Egyptians only, so long the recognised masters and teachers of the rest of the ancient world, can be supposed to have had no need to go to any of their contemporaries, in search of such secrets of science as they had been unable to learn of themselves; until in an evil hour they voluntarily descended from the lofty position which they had all along maintained until then, and of their own accord

[c] Cf. Bailly, Astronomie Ancienne, Liv. v. § xvi. p. 450. vi. § xix. p. 178, 179. Astronomie Indienne, Discours Prél. lxxxxvi. Lettres Édifiantes, xxvi. 128, 129. 268, 269.

committed the practical folly of exchanging a sound and genuine system for a vain and superficial counterfeit; their own traditionary astronomy for the fantastic and self-created astrology of the Chaldees.

We have come ourselves to the conclusion that this ecliptic period was really first discovered, and first reduced to perfection, and first applied to its natural uses and purposes, by the ancient Egyptians *. Next to the Apis cycle, the

* In Ptolemy's account of the authors of this ecliptic period he distinguishes, as we have observed, (virtually if not actually,) three orders of *μαθηματικοὶ*, that is astronomers; first, the *παλαιοὶ*, as referred to his own time, then *οἱ ἔτι παλαιότεροι*, with reference even to these: of whom he supposes two classes, one which had assumed the length of the period at 6585 days and one third, and another which had tripled this, and made it one of 19 756 days.

It is clearly to be collected both from his account and from the nature of things that these must have been distinct classes of astronomers. The simple period must have been prior in the order of time to the triple one; and those who assumed the simple period as of such and such an amount at first must have been prior in the order of time to those who tripled it. It is clear too that this was the first and oldest class of these astronomers; *οἱ ἔτι παλαιότεροι* in comparison of the oldest of those who came after them. These *παλαιοὶ* (so called as referred to Ptolemy's time) might include the Chaldæan astronomers; but the *ἔτι παλαιότεροι*, in reference even to them, can scarcely be supposed to have been meant of the same as the *παλαιοὶ* also.

It is to be collected from his account also that those who tripled the period gave it the name of *ἐξελιγμός*: but that those who discovered the simple period gave it no name except that of "the period." We shall probably see hereafter that the Sarus passed to the Greeks from the Egyptians at first under this name of "the period." The name of *ἐξελιγμὸς* is Greek; and must therefore be only the Greek version of some oriental term. Its proper meaning is "evolution" or "unrolling:" and in its secondary sense it would be a military rather than an astronomical term. It appears to have been given to the period as a cycle of *ἀποκαταστάσεις* of various kinds, such as the Chaldæans endeavoured to enucleate from it in the manner described by Geminus; in which sense and in which relation the name was very applicable to it.

We may presume then that this name was really first given to it by the Chaldæans, and that they were consequently the actual inventors, if they may be so called, of the triple period, though not of the simple. It is possible too that, as the *ἐξελιγμὸς* consisted of three cycles of the single period, and the Chaldæans were already familiar with a triplicate ratio of that kind in their own Sossus, and Nerus, and Sarus, they might transfer these terms in a modified sense to these three cycles of the ecliptic period

period itself was better adapted to the equable solar year than to any other; since as measured by days it contained 6585 integral cycles of that kind, and a fractional part of another, which differed so little from the third part of an

which made up the ἐξελιγμός; calling the first cycle the Sossus, the two first the Nerus, and all three (i. e. the ἐξελιγμὸς) the Sarus. On which principle this name of Sarus would more properly belong to the triple period than to the simple one. On the same principle too this term Sarus, as meant of the same thing as the ἐξελιγμὸς, must in all probability have had a meaning analogous to that. Some learned men, as we have said, have derived the word from a Chaldee one denoting restitution; and this view of its origin would agree to that explanation of its meaning.

It is very probable, as Ptolemy seems to assert, that the first authors of the period assumed it at 6585 days 8 hours; but only, as he also implies, ὁλοσχερῶς. If the standard of the mean lunation still recognised by the Egyptians was that of the Phœnix period, of which we have given an account, 223 lunations of that standard would contain,

6585 d·324 506 791 720 567 683 506
or 6585 d. 7 h. 47 m. 17 sec. 386 804 657 047 854 918 4

exactly. And this differs only 12 m. 42 sec. from 6585 d. 8 hours.

We are told by Ptolemy also that in one of these periods the mean longitude of the sun was observed or assumed to be 10° 40′ more than 18 entire circumferences, such as it must describe in 18 years. The term which he uses to express the fraction is δίτριτον, two thirds of a degree; and he evidently intends to speak of these 10 degrees and ⅔ds as something precise. This is further implied in the number of degrees supposed to be described by the moon in the triple period; viz. 260 312; 32 more than 723 circumferences; as both he and Geminus distinctly attest: for these 32 degrees, over and above the 723rd revolution, are only the sum of these 10° 40′ in three periods of the Sarus: and this number of degrees being a complete one, the number of minutes in the quantity 10° 40′ composing it must have been complete also.

Now 10° 40′ with the mean motion of our own tables are just equal to 10 d. 19 h. 43 m. 40 s·16

		d.	h.	m.	sec.
18 mean Julian years	=	6574	12	0	0·0
10° 40′ mean motion	=	10	19	43	40·16
Length of the Sarus on this principle		6585	7	43	40·16

which is only 3 m. 37 sec·23 less than the length which resulted from the standard of the Phœnix period.

Ptolemy indeed has qualified his statement in this respect by adding the words ὡς πρὸς τοὺς ἀπλανεῖς ἀστέρας: as if this stated difference of the longitude of the moon in one Sarus and that of 18 mean solar years was to be understood of 18 mean sidereal, not 18 mean Julian, years. But 18 mean sidereal years would contain 2 h. 44 m. 52 s·2 of mean solar time

entire day that it might be cyclically assumed as the third of a day exactly. In the standard of our own Fasti, 223 lunar months would contain only 6585 days, 7 h. 41 m. 29 s. ·362 of mean solar time: but in the standard assumed by the Egyptians at the epoch of their Phœnix cycle, and still retained, they would contain 6585 days, 7 h. 47 m. 17 s. ·387, only 12 or 13 minutes less than eight hours. And these would be equal to 18 equable years, 15 days, 8 hours perpetually.

The first 125 years from the date of the Apis cycle B. C. 973 down to B. C. 848 were probably those which the Egyptians devoted to the enucleation and perfecting of the period. And though we could not undertake to speak with confidence on so obscure a point, yet we have seen that B. C. 848, the close of this first Apis secular period of 125 years, was the date of the second revision of the sphere, purposely anticipated in order to coincide with that year; and if we are not much mistaken it was also the date of the beginning of a series of lunar and solar observations among the Egyptians, which necessarily imply that they must have been previously in possession of the ecliptic period, commonly called the Sarus: by which name we shall continue to speak of it, in conformity to the *modus loquendi* among chronologers and astronomers, though we have already, we trust, said enough to shew that this name must have been bestowed upon it at first only in a secondary sense, whensoever that was done.

more than 18 mean Julian; and this would make a difference of + 6′ 46″·26 in the supposed longitude of the sun, at the end of every Sarus, 10° 40′: and that would be too great a difference to be neglected.

The truth is that, in tracing the Sarus forwards perpetually, there must be a fixed term to serve as the point of departure; a solar and a lunar term, one for the ecliptic conjunction, the other for the ecliptic opposition. The proper representative of this term in each instance would be some Julian term. We shall see hereafter that there is reason to believe the Egyptians fixed on two terms of this description, April 25 and May 10. Now these were remarkable terms in the sphere of Mazzaroth also; the former being the Julian date of the first degree of the primitive Krion, the latter that of the fifteenth; each being understood of the degree complete, and each being terminated at mean noon, according to the Phœnix rule. The epoch of the Sarus, on this principle, would be referred from the first to the sphere of Mazzaroth; and that is sufficient to explain Ptolemy's reference of it to the stars.

We ground this inference on the following passage of Diogenes Laërtius.

Section IV.—*On the* 373 *solar eclipses, and the* 832 *lunar eclipses, of the Egyptians.*

Αἰγύπτιοι μὲν γὰρ Νείλου γενέσθαι παῖδα Ἥφαιστόν (φασιν)· ὃν ἄρξαι φιλοσοφίας, ἧς τοὺς προεστῶτας ἱερέας εἶναι καὶ προφήτας. ἀπὸ δὲ τούτου εἰς Ἀλέξανδρον τὸν Μακεδόνα ἐτῶν εἶναι μυριάδας τέσσαρας, καὶ ὀκτακισχίλια ὀκτακόσια ἑξηκοντατρία ἔτη· ἐν οἷς ἡλίου μὲν ἐκλείψεις γενέσθαι τριακοσίας ἑβδομηκοντατρεῖς, σελήνης δὲ ὀκτακοσίας τριακονταδύο[c].

No one can fail to remark that there is no kind of proportion between the length of time, supposed to have elapsed from this reign of the Egyptian Vulcan (Phthas) to that of Alexander, 48,863 years, and the number of eclipses, lunar and solar, supposed also to have been observed and recorded in the same interval of time. It is asserted in the books of astronomy[d] that the number of eclipses in a year cannot be less than two, and may be as great as seven. On the other hand, no astronomer has had occasion to refer to this statement without also observing that the number of solar eclipses, supposed to have been recorded in this interval of time, is not out of proportion to the number of lunar, which might have been observed and recorded in the same length of time also as that number of solar. For though there are in reality more solar than lunar eclipses every year, somewhere or other; yet, for a given locality on the surface of the earth, more lunar eclipses will be visible within a given period of time, than solar: every lunar eclipse being visible to all the inhabitants of one of the hemispheres of the earth, in their turn, but not every solar[dd].

Now this being the case, common sense itself must suggest that, though we might reject the period of 48,863 years at once as fictitious, hypothetical, or fabulous, we should not be justified in rejecting the statement relating to the number of

[c] Proœmium, cap. i. § 1: ii. § 2.

[d] See the tables and formulæ of the late F. Baily, esq., p. 51.

[dd] Bailly, Astronomie Ancienne, Liv. § xii. p. 167:

"Telle est effectivement la proportion qui regne entre ces deux especes d'éclipses vues sur un même horizon; et comme le remarque l'historien des mathématiques c'est une preuve qu'elles ne sont point fictives, et qu'elles ont été réellement observées."

observed eclipses, 373 of the sun, 832 of the moon. With regard to that period, perhaps an explanation might be given even of that*: but whether or not, it ought not to prejudice the possible truth of the other part of the statement, relating to the observation of solar and lunar eclipses during this period. It is self-evident that these observations could never have been extended over the whole of this period. They must have been confined to some part of it. The question is only to what part of it? and where that is to be found? At the beginning, or at the end, or any where else in the period itself? It cannot be found at the beginning, unless this period was a real one, and unless the Egyptian Vulcan had a real existence. But it may be found at the end; for Alexander the Macedonian had a real existence, and the æra of Alexander

* It is evident that this number is composed of 48,000, and 863. The former of these the reader will recognise as the great Phœnix period of 48,000 years, of which we have already given an account: so that on this principle these 48,863 years must have been assumed as equivalent to one period of this kind and 863 years of a second. If then we knew where the 48,000 years ended, we should know where the 863 years began; and if we knew where the 863 years ended we should know where the 48,000 years ended too. Now it cannot be considered unreasonable to assume that these 863 years ended much about the same time as the 832 eclipses supposed to have been observed in the same course of time. It will be seen, by and by, that these eclipses ended at the beginning of the astronomical æra called the æra of Alexander, or æra of Philip, the proper date of which was B. C. 324. The historical epoch of this æra however was one year later, B. C. 323—the beginning of the Macedo-Egyptian dynasty of the Ptolemies in Egypt. Let us suppose then that the series of eclipses terminated at the astronomical epoch; the 863 years at the historical epoch of this same æra, B. C. 323. On this principle they must be supposed to have begun B. C. 1186. Now this is just 80 years earlier than B. C. 1106—the date of the Chaldee correction of the primitive calendar, by virtue of which it became attached to August 8; and, as we have also concluded, the date of the Chaldee sphere, laid down in the 10th degrees of the sphere of Mazzaroth, that is at the very end of the tenth, and the very beginning of the eleventh. The Chaldees assumed the recession as one degree in 80 years. It is exceedingly probable that, though B. C. 1106 was the actual date of their own sphere, B. C. 1186 was the time when they received the sphere from the Egyptians. The period of 48,863 years was probably not imagined by the Chaldæans, but by the Egyptians; and these might purposely go back to B. C. 1186, 80 years before B. C. 1106; and place there the termination of the first great period of 48,000 years, and the beginning of the second.

was a real historical æra; reckoned back from which, 832 lunar eclipses, and 373 solar, might be found upon record among any of the nations of antiquity, and especially among the Egyptians, and yet at no incredible distance from the time of Alexander himself.

Let us only be permitted to assume that, by Alexander the Macedonian, Diogenes Laertius means the chronological æra, known in his time, and among the Egyptians, by the name of the æra of Alexander, or the æra of Philip; the historical epoch of which was Thoth 1 Nab. 425 in the equable style, Nov. 12 B. C. 324 in the Julian[e]. This assumption cannot reasonably be objected to: and that being granted, we are in possession of a datum, or *punctum stans*, from which we can reckon back, and put this statement of Diogenes to the test of the matter of fact.

Astronomers frequently observe that in the course of one of these ecliptic periods, of 223 synodic lunations, 6585 mean solar days, and 7 or 8 hours, 18 Julian years, and 10 or 11 days, 7 or 8 hours, there will generally be 70 eclipses of both kinds, 41 of the sun, and 29 of the moon[f]: and though this is not always the case, as any one may satisfy himself by tracing the series of such periods in Pingré's ecliptic tables, there can be no doubt that it is frequently so; and it may be considered to be generally so. The first test therefore of the probable truth of the statement of Diogenes may be taken from this fact. The number of lunar eclipses assigned by him being divided by 29, the quotient is 28, with a remainder of 20: so that on this principle such would be the number of eclipses of that description which there might be in 28 Sari, and part of a 29th. We say *might* be; for the actual number might be *more* or might be *less*. The number of actual lunar eclipses, in a given series of 223 consecutive lunations, may be as many as 30, and as few as 26; and may be 27, or 28, as well as 29. So that no one could say it was impossible, or even improbable, that 832 might be the actual number of lunar eclipses in a certain actual number of Sari complete.

In the next place, we observe that there are two eclipses,

e See the Introduction to the Tables, part i. ch. ii. sect. iv.

f Tables and Formulæ, p. 53.

marked in Pingré, B. C. 848, one of the sun, the other of the moon; the latter July 9 8.15 A. M. for the meridian of Paris, the former July 24 8.30 P. M. for the same meridian. And if we may only assume that this was the year, in which the Egyptians having perfected the Sarus, and being now in a condition to apply it to every eclipse both solar and lunar which was capable of occurring, first set themselves to make and record a series of observations of this kind; then it is capable of proof that beginning with the lunar eclipse of July 9 8.15 A. M. B. C. 848 *inclusive*, down to the lunar eclipse of Nov. 1 7.30 A. M. Paris, B. C. 324, *exclusive*, there was just the number of lunar eclipses, specified by Diogenes Laertius, viz. 832: spread over 29 Sari, and including the two first eclipses of the 30th. Any one may verify this assertion for himself by means of the tables of Pingré, in which he will find all these eclipses calculated; unless it should be considered a possible contingency that there may be some which have escaped his calculations; or some which might have happened for the meridian of Paris, but not for that of any part of Egypt; or *vice versa*. We have instituted this examination for our own satisfaction; and have found the result to be as we have just stated it: and for the satisfaction of our readers also, we will beg leave to exhibit it, in the following synopsis, Sarus by Sarus.

Succession of lunar eclipses, in the ecliptic Sarus of 223 *lunations,* 6585 *days,* 7 *or* 8 *hours, from the eclipse of July* 9 8·15 B. C. 848 *inclusive to that of Nov.* 1 7·30 A. M. B. C. 324 *exclusive, reduced from the tables of Pingré.*

Sari.	Sum of lun. eclipses in each Sari.	Sum collected of lun. eclipses in all the Sari.	B. C.	Æra Cyclica.	Æra of Nab.	Lunar eclipses.	Solar eclipses.
i	27	0	848	3159	..	9 July, $8\frac{1}{4}$ a.	24 July, $8\frac{1}{2}$ p.
ii	28	27	830	3177	..	20 July, $3\frac{1}{2}$ p.	5 August, 4 a.
iii	30	55	812	3195	..	30 July, $10\frac{3}{4}$ p.	15 August, $11\frac{3}{4}$ a.
iv	29	85	794	3213	..	11 August, $6\frac{1}{4}$ a.	26 August, $7\frac{1}{2}$ p.
v	28	114	776	3231	..	21 August, $1\frac{3}{4}$ p.	6 September, $3\frac{1}{2}$ a.
vi	28	142	758	3249	..	1 September, $9\frac{1}{2}$ p.	17 September, $11\frac{1}{2}$ a.
vii	28	170	740	3267	8	12 September, $5\frac{1}{2}$ a.	27 September, $7\frac{3}{4}$ p.
viii	28	198	722	....	26	23 September, $1\frac{1}{2}$ p.	9 October, 4 a.
ix	29	226	704	....	44	3 October, $9\frac{3}{4}$ p.	19 October, $0\frac{1}{4}$ p.
x	30	255	686	....	62	15 October, 6 a.	30 October, $8\frac{3}{4}$ p.
xi	30	285	668	....	80	25 October, $2\frac{1}{2}$ p.	10 November, 5 a.
xii	29	315	650	....	98	5 November, $11\frac{1}{4}$ p.	21 November, $1\frac{1}{2}$ p.
xiii	29	344	632	....	116	16 November, 8 a.	1 December, 10 p.
xiv	28	373	614	....	134	27 November, $4\frac{1}{2}$ p.	13 December, $6\frac{1}{2}$ a.
xv	28	401	596	....	152	8 December, $1\frac{1}{4}$ a.	23 December, $2\frac{3}{4}$ p.
xvi	28	429	578	....	170	19 December, 10 a.	3 January, 11 p.
xvii	29	457	560	....	188	29 December, $6\frac{1}{2}$ p.	14 January, 7 a.
xviii	30	486	541	....	207	10 January, 3 a.	25 January, 3 p.
xix	30	516	523	....	225	20 January, $11\frac{1}{2}$ a.	4 February, 11 p.
xx	29	546	505	....	243	31 January, 8 p.	16 February, 7 a.
xxi	29	575	487	....	261	11 February, $4\frac{1}{2}$ a.	26 February, 3 p.
xxii	28	604	469	....	279	22 February, $0\frac{1}{2}$ p.	8 March, 10 p.
xxiii	28	632	451	....	297	4 March, $8\frac{1}{2}$ p.	20 March, $5\frac{1}{4}$ a.
xxiv	29	660	433	....	315	15 March, $4\frac{1}{2}$ a.	30 March, $0\frac{1}{4}$ p.
xxv	30	689	415	....	333	26 March, $0\frac{1}{2}$ p.	10 April, 7 p.
xxvi	29	719	397	....	351	5 April, 8 p.	21 April, $1\frac{3}{4}$ a.
xxvii	30	748	379	....	369	17 April, $3\frac{3}{4}$ a.	2 May, $8\frac{1}{2}$ a.
xxviii	27	778	361	....	387	* *	12 May, $3\frac{1}{4}$ p.
xxix	26	805	343	....	405	* *	23 May, $9\frac{3}{4}$ p.
xxx	26	831	325	....	423	* *	3 June, $4\frac{1}{4}$ a.
xxxi	28	857	307	....	441	* *	14 June, $10\frac{3}{4}$ a
xxxii	27	885	289	....	459	* *	24 June, $5\frac{1}{4}$ p.
xxxiii		912	271	....	477	20 July, $8\frac{1}{2}$ a.	5 July, $11\frac{3}{4}$ p.

SECTION V.—*Remarks on the preceding synopsis.*

It is evident from this synopsis that if the Egyptians fixed on these two eclipses of July 9 and July 24, B. C. 848, as the epochs of the entire succession of eclipses of each kind; they fixed on consecutive eclipses, one only fifteen days before or after the other. There were none else in B. C. 848, which stood in any such relation to one another. It would be a necessary consequence of this choice, and of the laws of the Sarus, that the principal or leading eclipses of each series would preserve the same relation to each other, for a long time after, if not perpetually; and would recur at the begin-

ning of each Sarus, one fifteen days before and after the other, as they had occurred at first. The synopsis shews that this was actually the case for 27 cycles of the Sarus complete *.

* The question may perhaps be asked why the Egyptians fixed on this particular year, B. C. 848, and on these two eclipses in that year, as the head of the series in question? We can return only a conjectural answer to that question; yet one not destitute of probability.

The discovery of the Sarus among the Egyptians was probably the work of the 125 or 126 years which preceded this epoch of B. C. 848. In 126 years there are 7 periods of 18 years: so that a course and succession of Sari which might have begun to be observed and traced in B. C. 974 would necessarily lead up to B. C. 848.

Now it appears from the tables of Pingré that there was a lunar eclipse April 25 8.15 A. M. B. C. 974; and had there been a solar eclipse the same year, bearing the same relation to this as that of July 24 B. C. 848 to the lunar one of July 9, it must have been found in May, and on May 10. No such eclipse indeed appears in the tables in B. C. 974.

At the end of one Sarus however from this date, that is B. C. 956, we find both a lunar eclipse, May 5 3 P. M., and a solar one, May 21 0·30 A. M., which bore exactly the same relation to each other as the lunar one of July 9 B. C. 848 to the solar one of July 24 the same year.

From this time forward these two eclipses may be traced through successive Sari, down to B. C. 848, as follows:

i	B. C. 956	☽	*May 5	3.0 P. M.
		☉	May 21	0.30 A. M.
ii	B. C. 938	☽	*May 16	9.45 P. M.
		☉	*June 1	7.45 A. M.
iii	B. C. 920	☽	*May 27	4.45 A. M.
		☉	*June 11	3.0 P. M.
iv	B. C. 902	☽	June 7	11.30 A. M.
		☉	June 22	10.15 P. M.
v	B. C. 884	☽	*June 17	6.15 P. M.
		☉	*July 3	5.30 A. M.
vi	B. C. 866	☽	*June 29	1.15 A. M.
		☉	*July 14	1.0 P. M.
vii	B. C. 848	☽	July 9	8.15 A. M.
		☉	July 24	8.30 P. M.

This series would thus be connected with that of our list; which, on

In the course of time however a given ecliptic lunation is liable to get beyond the ecliptic limits; in which case, it must disappear from its place in the regular order of the Sarus: though, even under such circumstances, some other lunation becomes ecliptic, which was not so before. This case happened in the above synopsis first at the ingress of the xxviiith Sarus, B. C. 361; when the lunar eclipse which had kept company with the solar until then, at the distance of half a lunation, recurring at the beginning of every Sarus, is ob-

this principle, would only take up and continue it. Among the above eclipses, those marked with the asterisk, it is to be presumed, would be visible even in Egypt. It is therefore an exceedingly probable conjecture that the Sarus was discovered and perfected in the course of these 126 years, from B. C. 974 to B. C. 848: and that too, by following and tracing the succession of eclipses of both kinds, through the ecliptic period, either from B. C. 974 or from B. C. 956 to B. C. 848. In this case, the investigation would naturally begin with the two eclipses, one of the moon in April, the other of the sun in May; which being regularly followed would lead up at last to the first two on our list, B. C. 848, the principal eclipses of the whole succession of Sari from that time forward. It should be remembered that B. C. 974 was only one year earlier than the date of the Apis cycle B. C. 973. The ecliptic conjunction of May 10, B. C. 974, the fellow eclipse to that of April 25, the same year, (required by the law of the Sarus at least,) must have been the first conjunction of the first Apis cycle itself, the next year; the true date of which, as we shall see hereafter, was April 29 B. C. 973. It was natural for the Egyptians to fix the head of their Sari to the same time of the year as that of their Apis cycle. And had they discovered it, or at least reduced it to the necessary degree of perfection, before B. C. 973, when they instituted their Apis cycle, probably their series of ecliptic observations would have been found bearing date B. C. 974 instead of B. C. 848; and probably from the month of April, instead of the month of July. As it is, it may be said to have done so virtually. The series of observations which began *de facto* in July B. C. 848 must have begun virtually in April B. C. 974. The first Sarus of that series was the eighth of the other. The only difference is that during these first seven Sari of a common series the Egyptians were employed in enucleating the principle of the cycle, and preparing it for its proper application: with the commencement of the eighth, having now succeeded in reducing it to certainty, they began to apply it. The beginning of this process coincided with the second Apis period of 125 years; and that would be an additional reason for treating that period as a memorable one. The first ecliptic conjunction however was necessarily the fifth synodic conjunction of that second period, not the first; the new moon of Tybi: the calendar date of which indeed would be July 27 at 18h., but the true July 24.

served to disappear; though the solar eclipse continues to reappear at the head of successive Saruses still.

This could have made no difference to the continued observation of eclipses of both kinds, down to the 30th Sarus at least; which enters in the above list with the solar eclipse of June 3 4.15 A. M. at Paris, Nab. 423 B. C. 325; the last year of the period specified by Diogenes Laertius; the year before the æra of Alexander or æra of Philip, Nab. 425 B. C. 324. There was no lunar eclipse this year at all: and only one the next year, B. C. 324, (May 8 7.30 P. M. at Paris,) before that of Nov. 1 7.30 A. M. at Paris, only 11 days prior to the ingress of the æra of Philip itself, Nov. 12 = Thoth. 1. Nab. 425.

The sum total of lunar eclipses, in the first 29 of these Sari, as the synopsis shews, was 831 exactly: and including the first lunar eclipse of the 30th, May 8 7.30 P. M. at Paris, B. C. 324, it was exactly 832; and the whole succession of such eclipses having set out at first from July 9 B. C. 848, May 8 might naturally be considered the last, B. C. 324, referred to such a term as that: without passing to the eclipse of Nov. 1 the same year also. And this we think must be allowed to be a very critical coincidence, and a striking confirmation of the statement of Diogenes Laertius.

Whether the observation of these eclipses in the same way was continued by the Egyptians beyond the first year of the æra of Alexander or of Philip, B. C. 324, we cannot say. We have continued the series of Sari in our synopsis down to the xxxiiid, B. C. 271, in order to shew the effect which then took place; viz. the completion of the cycle of Sari, after making the entire circle of the Julian year; and its coming round to the point from which it set out, B. C. 848, with two consecutive eclipses also, one of the moon, the other of the sun; though not the same as at first; the former, in this state of reunion, being fifteen days later than the latter, whereas B. C. 848 it had been fifteen days earlier.

		h. m.
B. C. 848 we had the first lunar eclipse of Sarus i. ..	July 9,	8 15 A. M.
The first solar	July 24,	8 30 P. M.
B. C. 271 we have the first lunar ecl. of Sarus xxxiii.	July 20,	8 30 A. M.
The first solar	July 5,	11 45 P. M.

So that on this principle, the same lunar eclipse would appear to have returned almost to the same period of the noctidiurnal cycle, for a given meridian, that of Paris, in 577 years, + 11 days, and the same solar in 577 years, − 19 days.

We have not considered it necessary to reduce these lunar eclipses from the meridian of Paris to that of Heliopolis or of Memphis: for that was not necessary, for the sake of the review which we were about to institute. Neither have we taken the number of solar eclipses, within the same interval of time as these lunar, into the account: much less attempted to determine which of them would be visible for a given meridian, like that of Heliopolis or Memphis. It is desirable however that this should be done by some competent person; since, if the statement of Diogenes has turned out to be correct with regard to the number of lunar eclipses, supposed to have been observed in this course of time, it is to be presumed that it will be found on examination equally correct with regard to the number of solar. It must be evident however even in this case, from the proportion of the latter to the former, that though every lunar eclipse which could possibly have happened within the interval of time in question might be, or rather must have been, taken into *that* account; none but *visible* solar eclipses, in all probability, could have entered into *this*.

It must be admitted that the coincidence which has just been pointed out between the actual number of lunar eclipses from July 9 B. C. 848 to May 8 B. C. 324, and the number specified by Diogenes Laertius, as observed by the Egyptians from a certain time down to the æra of Alexander or of Philip, is surprisingly close. Whether it could be purely fortuitous and accidental, we leave others to judge. But if it cannot be reasonably explained on that principle, then the use which we make of the fact of such a coincidence is this: That this complete and entire agreement between the number of eclipses supposed to have been observed during the interval in question, and the number which could possibly have been observed, (that is, have actually happened,) never could have been produced, if the Egyptians had been left to observation only, and to the evidence of their senses; and if they had not been in possession of the means of knowing

what lunar eclipses would happen, and when, whether they were capable of being observed or not. For many of these eclipses happened in the day-time, and after the moon must have been set; and though they would be visible in the lower hemisphere, they would not be so in the upper. The principal lunar eclipse of all, that of July 9, 8h. 15m. A. M. B. C. 848, must have been of that description; the true time of which at Heliopolis would be July 9, 10h. 10m. A. M. We should not be justified in inferring from this fact, that such eclipses would not be known to the Egyptians; or if known, would not be taken into their account. This last supposition indeed is confuted by the actual matter of fact: for had all such eclipses as these been actually left out of the account, then the actual number of recorded eclipses, 832, never could have agreed so exactly to the truth. But we are justified in inferring from it that, as such eclipses could not become known at the time by the sensible observation of the phenomena themselves, they must have become known in some other way; and therefore through the Sarus; which would indicate both the fact and the time of these invisible eclipses, as much as those of the visible. We conclude then that before the Egyptians began to keep an account of these observations, in the manner implied by Diogenes, they must have discovered the Sarus, and must have perfected it too.

It will no doubt however be objected to the preceding account that, if the Egyptians were really in possession of lunar eclipses which went back to B. C. 848, 127 years earlier than any thing of the kind recorded at Babylon; Hipparchus and Ptolemy must have known of them, and might be expected to have appealed to them. With regard to Hipparchus, whether he did not know of such Egyptian observations, and whether he did not actually make use of them for his own purposes, no one could undertake to say with confidence, who had not read his own works, and was not acquainted with every thing contained in them. It is the opinion of Cassini at least that Hipparchus must have been aware of older lunar observations than those which he could have learnt from the Babylonians merely. With regard to Ptolemy, his silence concerning any such ancient observations of the Egyptians is simply neutral. If he no-

where in so many words affirms their existence, he certainly nowhere denies it. And he may be said virtually to imply it, in such allusions as those which we produced above to the authors of the ecliptic Sarus, and to the steps by which they found it out. It is precarious to assume that an author of antiquity was ignorant of any thing, relating even to his proper subject, which he does not expressly mention. It is certain that Diogenes Laertius affirms the existence of these Egyptian observations: and therefore that, whether Hipparchus or Ptolemy was aware of them or not, he might have known of them; they must have been older than *his* time at least*.

* The silence of Hipparchus and Ptolemy with respect to any observations of the Egyptians, known to or used by them, is more than counterbalanced by the positive testimony of others of the ancients, who attribute to them observations, both lunar and sidereal, of very great antiquity; and from their personal knowledge of the fact. Some of these we here subjoin.

i. Aristotle, De Cœlo ii. 12: Opp. i. 292. 3: *Δῆλον δὲ τοῦτο περὶ ἐνίων καὶ τῇ ὄψει γέγονεν. τὴν γὰρ σελήνην ἑωράκαμεν διχότομον μὲν οὖσαν ὑπελθοῦσαν δὲ τὸν ἀστέρα τὸν Ἄρεος, καὶ ἀποκρυφθέντα μὲν κατὰ τὸ μέλαν αὐτῆς ἐξελθόντα δὲ κατὰ τὸ φανὸν καὶ λαμπρόν. ὁμοίως δὲ καὶ περὶ τοὺς ἄλλους ἀστέρας λέγουσιν οἱ πάλαι τετηρηκότες ἐκ πλείστων ἐτῶν Αἰγύπτιοι καὶ Βαβυλώνιοι, παρ' ὧν πολλὰς πίστεις ἔχομεν περὶ ἑκάστου τῶν ἄστρων*—Simplicius, 497. 19. *a*: on De Cœlo, ii. 12: *Ἀλλὰ τοῦτο μὲν* (the preceding occultation) *αὐτὸς ἐθεάσατο· καὶ περὶ τοὺς ἄλλους δὲ ἀστέρας τὸ αὐτὸ συμβὰν τοὺς* (lege *τῶν*) *ἀνωτέρων ἐτήρησαν Αἰγύπτιοί τε καὶ Βαβυλώνιοι, ὡς πολλὰς αὐτῶν περὶ ἑκάστου τῶν ἄστρων τηρήσεις παραδεδόσθαι*—Idem, 475. 18. *b*. (on De Cœlo, i. 14. 270. *b*. 14.): *Ἤκουσα ἐγὼ τοὺς μὲν Αἰγυπτίους ἀστρῴας τηρήσεις οὐκ ἐλαττόνων ἑξήκοντα τριῶν μυριάδων ἐτῶν ἀναγράπτους ἐσχηκέναι, Βαβυλωνίους δὲ ἑκατὸν καὶ τεσσαράκοντα καὶ τεσσάρων μυριάδων.*

ii. Cicero, De Natura Deorum, ii. 61, 153: Ab hominum genere finitus est dies mensis annus: defectiones solis et lunæ cognitæ, prædictæque in omne posterum tempus quæ quantæ quando futuræ sint—Diodorus Sic. i. 50. (cf. 81:) De Thebanis (Ægyptiis): *Περὶ δὲ τῶν ἐκλείψεων ἡλίου τε καὶ σελήνης ἀκριβῶς ἐπεσκέφθαι δοκοῦσι. καὶ προρρήσεις περὶ τούτων ποιοῦνται, πάντα τὰ κατὰ μέρος γινόμενα προλέγοντες ἀδιαπτώτως.*

iii. Cleomedes, De Sublimibus, ii. vi. 147. 12: *Ἀλλὰ πρῶτον μὲν ἀπαντητέον λέγοντας* (he is combating the idea of the possibility of a lunar eclipse while the sun was still visible in the opposite horizon) *ὅτι πέπλασται ὁ λόγος .... πολλῶν γὰρ ἐκλείψεων σεληνιακῶν γεγενημένων καὶ τελείων καὶ ἀπὸ μέρους καὶ ἀναγεγραμμένων πασῶν, οὐδεὶς τοιαύτην ἔκλειψιν μέχρι γε*

In answer however to this seemingly specious objection, taken from the silence of Ptolemy, and possibly even of Hipparchus, (though this last must always be a doubtful point,) relative to these lunar observations of the Egyptians; we have it in our power, as we believe, to shew that they were known to Eudoxus; and not only known to him, but used by him for a particular purpose of his own. If this can be made out, there is an end to the objection from the silence of Ptolemy, and even of Hipparchus. To the proof of this fact then, in the hope of the Divine blessing on our endeavours, we will proceed.

SECTION VI.—*On the ecliptic περίοδος of Eudoxus, and on its derivation from the Egyptian, exhibited above.*

There is a remarkable passage in Plutarch's treatise De Facie in Orbe Lunæ[g]; which we must begin with producing.

Εἴπερ οὖν ἡ σελήνη πυρὸς εἴληχε βληχροῦ καὶ ἀδρανοῦς ἄστρον οὖσα θολερώτερον, ὥσπερ αὐτοὶ λέγουσιν, οὐθὲν ὧν πάσχουσα

τοῦ καθ' ἡμᾶς βίου ἱστορεῖται ἀναγεγραφὼς οὐ Χαλδαῖος οὐκ Αἰγύπτιος, κ̓, τ. λ.

iv. Seneca, Natur. Quæst. vii. iii. i: Opp. v.: § 1. Eudoxus primus ab Ægypto hos motus (the five planets) in Græciam transtulit. hic tamen de cometis nihil dicit. ex quo apparet ne apud Ægyptios quidem (so that he brought the rest of his observations from Egypt also) quibus major cœli cura fuit hanc partem elaboratam—§ 2: Conon postea diligens et ipse inquisitor defectiones quidem solis servatas ab Ægyptiis collegit, (N. B. Eudoxus had already brought those of the moon,) nullam autem mentionem fecit cometarum.

v. It is plainly implied by Strabo, (xvii. i.) as we shall see hereafter, that an earlier generation of Greek astronomers brought into Greece the Egyptian observations, translated by themselves from the Egyptian into Greek; and so made them accessible to their countrymen: and by this earlier race of astronomers the context shews that he meant Eudoxus, Plato, and their contemporaries.

According to Eudemus, (author of an history of astronomy, of which one or two fragments remain,) Thales of Miletus predicted eclipses. (See Diogenes Laertius, Vita, lib. i. cap. i. sect. ii. 23. Cf. Fabricius, Bibliotheca Græca, lib. iii. cap. ii. p. 277.) He does not say one eclipse, the memorable eclipse of Thales; but eclipses generally. This may lead us to suspect that Thales had acquired a knowledge of the Sarus; in which case it was most probably in Egypt, which country it is known that he visited.

[g] Cap. xx.

*φαίνεται νῦν, ἀλλὰ τὰ ἐναντία πάντα πάσχειν αὐτὴν προσῆκόν ἐστιν· φαίνεσθαι μὲν ὅτε κρύπτεται, κρύπτεσθαι δὲ ὁπηνίκα φαίνεται· τουτέστι κρύπτεσθαι μὲν τὸν ἄλλον χρόνον ὑπὸ τοῦ περιέχοντος αἰθέρος ἀμαυρουμένην, ἐκλάμπειν δὲ καὶ γίνεσθαι καταφανῆ δι' ἓξ μηνῶν, καὶ πάλιν διὰ πέντε τῇ σκιᾷ τῆς γῆς ὑποδυομένην· αἱ γὰρ πέντε καὶ ἑξήκοντα καὶ τετρακόσιαι περίοδοι τῶν ἐκλειπτικῶν πανσελήνων τὰς τέσσαρας καὶ τετρακοσίας (ἐκλείψεις) ἑξαμήνους ἔχουσι, τὰς δ' ἄλλας πενταμήνους. ἔδει τοίνυν διὰ τοσούτων χρόνων φαίνεσθαι τὴν σελήνην ἐν τῇ σκιᾷ λαμπρυνομένην· ἡ δὲ** (*supple *ἐν τῇ σκιᾷ*) *μὲν ἐκλείπει καὶ ἀπόλλυσι τὸ φῶς, ἀναλαμβάνει δ' αὖθις ὅταν ἐκφυγῇ τὴν σκιὰν, καὶ φαίνεται γε πολλάκις ἡμέρας, ὡς πάντα μᾶλλον ἢ πυρινὸν οὖσα σῶμα καὶ ἀστεροειδές.* Add to this the following also[h]: *Οὐ γὰρ ἓξ μῆνας ἀλλὰ παρ' ἓξ μῆνας* (every six months, at the distance of six months) *ὁρῶμεν αὐτὴν ὑπὸ τῆς γῆς ὥσπερ ὑπὸ τῆς μητρὸς τῇ σκιᾷ λαμβανομένην· ὀλιγάκις δὲ τοῦτο διὰ πέντε μηνῶν παθοῦσαν.*

We are not concerned with the reasoning of Plutarch in this passage, or with the point which he is endeavouring to establish; viz. that the moon does not, like the stars or the sun, shine by means of any light of its own: though every physical astronomer will admit that such a proposition was always true. We desire to direct the attention of the reader to the allusion to the 465 *periods,* as they are termed, of the ecliptic full moons, that is, *returns of the ecliptic lunations;* which also occurs in this passage. No such ecliptic period as one of 465 months, so far as we are aware, is known to astronomers; and yet such a period, it is evident, is referred to and recognised here: and as something well known too. The use of the article in the introduction to the allusion, *αἱ γὰρ πέντε καὶ ἑξήκοντα καὶ τετρακόσιαι περίοδοι τῶν ἐκλειπτικῶν πανσελήνων*—must imply that. For why, *αἱ γὰρ πέντε κ', τ. λ.* and not simply *πέντε γὰρ καὶ κ', τ. λ.* unless some particular 465 cycles of that kind were meant? Why too, in the second of the above quotations, does he end with saying, *ὀλιγάκις δὲ τοῦτο διὰ πέντε μηνῶν* (*ὁρῶμεν αὐτὴν*) *παθοῦσαν*, and not *πάσχουσαν?* if he was not referring not to what was ordinarily seen to be happening, but to what *had* been seen to have actually happened; and therefore in the actual scheme and delineation of a cycle of such a kind, in which all those phenomena,

[h] Cap. xxvii.

and the circumstances under which they happened, had been represented and exhibited.

The true explanation of this allusion involves a very curious and interesting discovery; a discovery which never could have been made without a concurrence of remarkable circumstances; i. e. without the assistance of that ecliptic cycle of the ancient Egyptians, which we have just been considering, without that testimony of Diogenes Laertius, which induced us to seek for it in the actual cycle of eclipses during the period in question; without the tables of Pingré, in which the course and succession of eclipses of both kinds, for a thousand years before the Christian æra, has been more or less accurately calculated; nor lastly, without this passage of Plutarch, which connects another cycle of the same kind among the Greeks with this cycle of the Egyptians. A superficial and unreflecting observation would look upon this concurrence of circumstances as fortuitous and accidental. We regard it as providential. We consider these different and concurrent circumstances only the mysterious links which in the hands of a superintending Providence bind together and make one of the great chain of truth.

The celebrated astronomer of antiquity, Eudoxus, it is agreed, was a contemporary of Socrates and Plato. Some accounts represent him as a disciple of Socrates'; others as a scholar of Plato's. It is agreed however that, after the death of Socrates, both he and Plato, or he himself in particular, visited Egypt: and into the date of that visit we shall inquire by and by. In making this visit to Egypt, Eudoxus had a certain object in view: viz. to collect the necessary data on which to found his correction of the octaëteric cycle; a correction which it is known that he published, after his return from Egypt, and some time before his death. And it is sufficient to explain that object, to state that the first period of the original octaëteric correction, which had superseded the primitive solar calendar among the Greeks in the shape of the third type of the Hellenic lunar calendar, (of which we have already given some account[r],) in his time was fast approaching to its termination. It is evident that nothing would be better calculated to answer

[r] Diss vii. ch. iii. sect. v. vol. i. 570: ch. iv. sect. iii. Ib. 592: ch. v. sect. iii. Ib. 603.

his purpose, and to furnish him with the data in question, than an exact series of lunar eclipses: and he appears to have gone to Egypt, not only for other reasons but in particular for this; and in the hope of finding what he was in search of there.

Some of the ancients (as Strabo in particular) have spoken of his residence in Egypt as if it lasted 13 years; others, with more probability, as if only 15 or 16 months. They speak too of the habitual shyness and reserve of the priests in Egypt towards the strangers who came among them in the hope of obtaining access to their secrets; and especially towards the Greeks: but it is also agreed that Eudoxus stayed long enough among them to conciliate their good-will, and to induce them in some degree to gratify his eager and importunate search after knowledge, by communicating to him some part at least of their own discoveries. There can be little doubt that he brought back to Greece with him a perfect knowledge of the mean Julian year, and of the cycle of leap-year: and though the Egyptians did not explain to him, nor probably to any stranger who ever came among them from any quarter, the true theory of their Phœnix periods; yet they communicated to him, as we shall see by and by, the first revision of their sphere, of the epoch of the second period of that kind: and in particular, (and this is the point with which we are chiefly concerned at present,) they gave him access to their records of lunar observations, including the ecliptic cycle above described, and allowed him to make what use he pleased of them.

The year in which he paid this visit to Egypt, we believe to have been either B. C. 399, after the death of Socrates, or early the next year, B. C. 398: the year in which he left it, to have been B. C. 397, but not less than 15 or 16 months afterwards. In the cycle of Sari, which we have described, this year, B.C. 397, was the date of the xxvith, which entered with the lunar eclipse of April 5 at 8 P. M. (Paris), that very year. Having therefore received permission of the priests of Heliopolis to inspect this cycle, and to extract any portion of it which he pleased, he went back to the xth Sarus; the date of which, as our synopsis shews, was B. C. 686: and having found an ecliptic full moon that year, on April 22, 1.45 A. M.

(Paris), he made it the base, or point of departure, of a cycle of 16 Sari, from the xth in this Egyptian scheme to the xxvith, B. C. 686 to B. C. 397, through which to follow and trace perpetually this particular ecliptic full moon, from April 22, 1.45 A. M. B. C. 686, where the cycle began, at the ingress of the first of these Sari, to April 5 at 8 P. M. B. C. 397, the ingress of the seventeenth, where the cycle ended by coming round to the point from which it had set out.

But in order to render what we are saying intelligible, we must draw out and exhibit the same kind of scheme of this ecliptic cycle of Eudoxus, as we have already done of the Egyptian: combining with this too so much of the Egyptian as runs parallel to it from beginning to end.

Ecliptic period of Eudoxus, or cycle of xvi Sari, shewing the course of the same ecliptic full moon round the year, from April 22 B. C. 686 *to April* 5 B. C. 397.

B. C.	Æra of Nab.	Egyptian cycle of Sari.	Sum of eclipses in the Sarus.	Sum collected	Lunar eclipses.	Solar eclipses.	Ecliptic cycle of Eudoxus.	Eclipses in each Sarus.	Sum collected	Lunar eclipses.	Πεντάμηνα.	Ἑξάμηνα.
686	62	x	30	255	15 October, 6 a.	30 October, 8¾ p.	i	30	0	22 April, 1¾ a.	5	25
668	80	xi	30	285	25 October, 2½ p.	10 November, 5 a.	ii	30	30	2 May, 9 a.	5	25
650	98	xii	29	315	5 November, 11¾ p.	21 November, 1½ p.	iii	29	60	13 May, 4 p.	5	24
632	116	xiii	29	344	16 November, 8 a.	1 December, 10 p.	iv	29	89	23 May, 11¼ p.	5	24
614	134	xiv	*28	373	27 November, 4½ p.	13 December, 6½ a.	v	*29	118	4 June, 6¼ a.	5	24
596	152	xv	28	401	8 December, 1¼ a.	23 December, 2¾ p.	vi	28	147	8 December, 1¼ a.	5	23
578	170	xvi	28	429	19 December, 10 a.	3 January, 11 p.	vii	28	175	19 December, 10 a.	5	23
560	188	xvii	29	457	29 December, 6½ p.	14 January, 7 a.	viii	29	203	29 December, 6½ p.	5	24
541	207	xviii	30	486	10 January, 3 a.	25 January, 3 p.	ix	30	232	10 January, 3 a.	5	25
523	225	xix	30	516	20 January, 11½ a.	4 February, 11 p.	x	30	262	20 January, 11½ a.	5	25
505	243	xx	29	546	31 January, 8 p.	16 February, 7 a.	xi	29	292	31 January, 8 p.	5	24
487	261	xxi	29	575	11 February, 4½ a.	26 February, 3 p.	xii	29	321	11 February, 4½ a.	5	24
469	279	xxii	28	604	22 February, 0½ p.	8 March, 10 p.	xiii	28	350	22 February, 0½ p.	5	23
451	297	xxiii	28	632	4 March, 8½ p.	20 March, 5¼ a.	xiv	28	378	4 March, 8½ p.	5	23
433	315	xxiv	29	660	15 March, 4½ a.	30 March, 0¾ p.	xv	29	406	15 March, 4½ a.	5	24
415	333	xxv	30	689	26 March, 0½ p.	10 April, 7 p.	xvi	30	435	26 March, 0½ p.	5	25
397	351	xxvi	29	719	5 April, 8 p.	21 April, 1¾ a.	xvii	—		5 April, 8 p.	—	—
				464				465			80	385

SECTION VII.—*Observations on the preceding cycle.*

i. The first remark to be made on these two schemes is that the second (Eudoxus') is to be considered a distinct and independent cycle of its own, though originally derived from the Egyptian; which we combine with it in the same representation.

ii. This cycle of Eudoxus begins, strictly speaking, in the *ninth* Sarus of the Egyptian cycle; and its base, or point of departure, the ecliptic full moon of April 22, B. C. 686, was one of the eclipses of that Sarus, not of the tenth.

iii. The cycle of Eudoxus notwithstanding, at the epoch of its vith Sarus, falls in with the Egyptian at that of its xvth. And the same ecliptic full moon, Dec. 8, 1.15 A. M. B. C. 596 is the first in both.

iv. The sum total of ecliptic full moons in the cycle of Eudoxus, from April 22 B. C. 686, the first of his first Sarus, to Dec. 8 B. C. 596, the first of his sixth, where his cycle falls in with the Egyptian, is 147 exactly: that in the Egyptian, between the corresponding points of time, is 146; i. e. just one less. This was simply the consequence of beginning the former cycle with the full moon of April, B. C. 686, April 22, instead of the full moon of October, the same year, Oct. 15: but the effect which would follow from it at last would necessarily be this; that in the xvi Sari, which made up the cycle of Eudoxus, from B. C. 686 to B. C. 397, the number of ecliptic full moons in all would be 465; in the corresponding portion of the Egyptian, consisting of xvi Sari too, the number would be only 464.

v. The reader will not fail to remember here that Plutarch's period of ecliptic full moons was one of 465, not of 464: and consequently that, if it was taken from one of these cycles, it must have been taken from the cycle of Eudoxus, not from the Egyptian. And every one must admit that this would be a striking coincidence; and well calculated to connect this allusion in Plutarch with this cycle of Eudoxus at once.

vi. Plutarch proceeded to observe that, in this cycle of 465 ecliptic full moons, there were 404 which he called *ἑξάμηνα*, the rest (which on this supposition must have been 61 in

number) being πεντάμηνα: i. e. 404 six months asunder, and 61 five months asunder. We could not put this statement to the test of the matter of fact, without examining the eclipses in Pingré through each of these Sari in succession, from B. C. 686 to B. C. 397; in order to ascertain which of them in each Sarus actually stood at the distance of six months asunder from one another, and which did not. It is proper however to observe that by five months, in contradistinction to six, the necessity of the case requires Plutarch to be supposed to mean sometimes one year + *five* months asunder, and sometimes six months + five months asunder; for it will be found by any one, who shall institute this examination of the actual eclipses, recorded in Pingré, between the extreme dates in question, that all which were not exactly six months asunder were in reality either 17 months (=12+5) or 11 months (=6+5) asunder. Having instituted this examination for our own satisfaction, we shall proceed to lay it before our readers for theirs: premising that we set down in the synopsis subjoined only such eclipses as were 17 months or 11 months asunder, in each Sarus: all the rest in each Sarus, it will be understood, were six months asunder.

Synopsis of ecliptic full moons, five months asunder, in the ecliptic cycle of xvi Sari, B. C. *686 to* B. C. *697.*

Sarus.	B. C.		Months.
i	684	September 23	17
	682	February .. 7	
	680	July 11	11
	679	June 2	
	677	November .. 3	17
	675	March 21	
	673	August 23	17
	671	January .. 7	
	669	June 11	11
	668	May 2	
ii	666	October .. 4	17
	664	February .. 17	
	662	July 23	11
	661	June 12	
ii	659	November 15	17
	657	March 31	
	655	September .. 3	17
	653	January .. 18	
	651	June 22	11
	650	May 13	
iii	648	October .. 15	17
	646	March 1	
	644	August 2	17
	643	December 18	
	641	November 25	17
	639	April 11	
	637	September 13	17
	635	January .. 29	

Sarus.	B. C.			Months.
iii	633	July	2	11
	632	May	23	
iv	630	October	26	17
	628	March	11	
	626	August	13	17
	625	December	28	
	623	December	6	17
	621	April	22	
	619	September	25	17
	617	February	9	
	615	July	14	11
	614	June	4	
v	612	November	5	17
	610	March	22	
	608	August	24	17
	606	January	8	
	605	December	17	17
	603	May	3	
	601	October	5	17
	599	February	19	
	597	July	24	17
	596	December	8	
vi	594	November	17	17
	592	April	2	
	590	September	4	17
	588	January	19	
	586	June	24	17
	585	November	7	
	583	October	16	17
	581	March	2	
	579	August	4	17
	578	December	19	
vii	576	November	27	17
	574	April	13	
	572	September	14	17
	570	January	30	

Sarus.	B. C.			Months.
vii	568	July	4	17
	567	November	18	
	565	October	27	17
	563	March	13	
	561	August	14	17
	560	December	29	
viii	557	June	2	11
	556	April	23	
	554	September	26	17
	552	February	9	
	550	July	15	17
	549	November	28	
	547	November	7	17
	545	March	23	
	543	August	26	17
	541	January	10	
ix	539	June	13	11
	538	May	4	
	536	October	6	17
	534	February	21	
	532	July	26	17
	531	December	10	
	528	May	13	11
	527	April	4	
	525	September	5	17
	523	January	20	
x	521	June	24	11
	520	May	15	
	518	October	17	17
	516	March	3	
	514	August	6	17
	513	December	20	
	510	May	25	11
	509	April	14	
	507	September	16	17
	505	January	31	

Sarus.	B. C.		Months.
xi	503	July 5	17
	502	November 19	
	500	October .. 28	17
	498	March 14	
	496	August.... 16	17
	494	January.... 1	
	492	June...... 4	11
	491	April 25	
	489	September 27	17
	487	February .. 11	
xii	485	July 15	17
	484	November 30	
	482	November.. 8	17
	480	March 25	
	478	August.... 27	17
	476	January .. 11	
	474	June...... 15	11
	473	May 6	
	471	October.... 8	17
	469	February .. 22	
xiii	467	July 26	17
	466	December 11	
	464	November 18	17
	462	April...... 5	
	460	September.. 7	17
	458	January .. 22	
	456	June...... 26	17
	455	November.. 9	
	453	October .. 19	17
	451	March 4	

Sarus.	B. C.		Months.
xiv	449	August.... 6	17
	448	December 21	
	445	May 26	17
	444	October.... 9	
	442	September 18	17
	440	February .. 2	
	438	July 7	17
	437	November 20	
	435	October .. 30	17
	433	March 15	
xv	431	August.... 17	17
	429	January.... 2	
	427	June...... 6	17
	426	October .. 21	
	424	September 28	17
	422	February .. 13	
	420	July 17	17
	419	December.. 1	
	416	May 5	11
	415	March 26	
xvi	413	August.... 27	17
	411	January ... 12	
	409	June...... 16	17
	408	October .. 31	
	405	April...... 4	11
	404	February .. 23	
	402	July 29	17
	401	December.. 11	
	398	May 16	11
xvii	397	April...... 5	

It appears from this synopsis, that the sum total of pairs of full moons, which answered to this description in this succession of 16 Sari, exclusive of that of May 16 B. C. 398 and April 5 B. C. 397, (which must be left out of the account, because it comprehends the first ecliptic lunation of the xviith

Sarus, i. e. the first of a second cycle of 16 Sari, as much as the last of the first,) was 79 exactly: and that 15 of these were 11 months asunder; leaving 64 which were 17 months asunder. And these last are what Plutarch means by his reference to the *πεντάμηνα πανσέληνα* in particular; those which were in reality 17 months, one year and five months, asunder, not those which were eleven months, only half a year and five months asunder. Sixty-four then being subtracted from 465 it leaves 401, as the number of *ἑξάμηνα πανσέληνα*, also supposed by him. And though this is represented in his text as it stands at present by 404, yet 404 may evidently be a corruption of 401; produced by the confusion of the Greek numeral for unity with that for four: *τὰς Δ καὶ τετρακοσίας*, instead of *τὰς Α καὶ τετρακοσίας*: a confusion which might very easily be made.

SECTION VIII.—*Of the visit of Eudoxus to Egypt: and of the ὀκταετηρὶς and the περίοδος ascribed to him.*

There cannot be any doubt, as we have already observed, that Eudoxus visited Egypt. Nor can there be any that he was the author of an *ὀκταετηρίς*; of a lunar cycle or a lunar correction of some kind, at least, which went by that name: though this is not the proper time nor place for entering upon the consideration of that cycle; nor even of all the particulars connected with the chronology of the visit of Eudoxus himself to Egypt.

We think it right however to mention, as a critical coincidence on this question, that according to Diogenes Laertius he took with him letters of introduction or recommendation from Agesilaüs king of Sparta to the reigning king of Egypt; whom Diogenes indeed calls Nectanabis[k], but who, according to Diodorus Siculus[l], must have been more truly called Psammitichus. The date of the accession of Agesilaüs is an uncertain point; but Mr. Clinton[m] does not make it later than B. C. 398: so that if Eudoxus did not go to Egypt until after the death of Socrates, (the true time of which was the middle of the month of June B. C. 399,) it is manifest that

[k] viii. cap. viii. Eudoxus, ii. § 87. Cf. Plutarch, De Genio Socratis, vii. Also Diodorus Sic. i. 96, 98.

[l] xiv. 35. Olymp. xcv. 1. Laches, B. C. 400—399.

[m] Fasti Hellenici, App. ch. 3. Proclidæ, 20. Plutarch would make his accession a year or two earlier.

he might take with him letters from Agesilaüs even after he had come to the throne at Sparta: and yet it must be allowed that the coincidence, under such circumstances, would be very close and critical. According to Diogenes[m], he remained one year and four months in Egypt: and if we may suppose him to have been still there, April 5 B. C. 397, when the above cycle of Sari expired, and for a month or two longer also, it is manifest that he must have arrived in the spring of B. C. 398: at which time Agesilaüs was undoubtedly king at Sparta.

We observe also, as another singular coincidence on the question of the chronology of this visit, that, according to some accounts which Diogenes had seen, his Octaëteris was composed in Egypt: Καὶ τέτταρας μῆνας πρὸς ἐνιαυτῷ διατρίψαντα αὐτόθι (in Egypt) ξυρόμενόν τε ἥβην καὶ ὀφρῦς τὴν ὀκταετηρίδα κατά τινας συγγράψαι. And this would be a very extraordinary statement, had we not the means of accounting for it; viz. that Eudoxus should have gone to Egypt, above all places, on purpose to construct an Octaëteris: as if Egypt in particular was the country in which either the Octaëteric or the Metonic cycle, or any other lunar cycle properly connected with the Julian and not with the equable year, was best understood, or had been most studied and improved. But the statement is explained as soon as it is understood that he went to Egypt merely to collect the *data* for his Octaëteris: and that he found them in the ecliptic cycle of Sari, above described.

It must be inferred from the testimony of Geminus, which we produced[n] relating to the Egyptian Isia, that the date of the winter solstice κατ' Εὔδοξον was an important term in his calendar. We learn from Geminus himself[o] that his date of the winter solstice was the fourth of Ægon, Dec. 28, and his date of the vernal equinox was the 6th of Krion, March 29. The third type of the Hellenic Octaëteris being that which Eudoxus principally had in view in the corrected scheme of that cycle which he was contemplating, it is to be observed that its date in his time was Jan. 7; but that at the expira-

m viii. cap. viii. Eudoxus, ii. § 87. Cf. Plutarch, De Genio Socratis, vii. Diodorus Sic. i. 96, 98.

n Diss. xii. ch. i. sect. vi. vol. ii. 391: ch. iv. sect. ii. Ib. 446.

o Cap. xvi. Uranolog. 67. D.—69 A.

tion of its first period of 160 years, B. C. 382, it must necessarily become Jan. 8: in which case, the stated date of the second year of its proper cycle would be Dec. 28, Eudoxus' assumed date of the winter solstice. It was a very probable contingency that, at the expiration of the first 160 years of this type, many of the Greeks would advance the head of their calendar from January to April or May; and we have it in our power to prove that some of them did so, from Jauuary 8 to May 6, B. C. 382 itself: and that others might choose to continue it, attached to the same season of winter as before, for another period of 160 years. Eudoxus' proposed correction of the Octaëteric cycle appears to have been designed to meet both these cases; both the convenience of those who should choose to transfer the beginning of their year to April or May, and that of those who should prefer to retain it in January or in December, using the same Octaëteric type of the calendar as before.

And yet the dates of these two principal terms, the mean vernal equinox, and the mean winter solstice, ascribed to him are very remarkable. They are not the dates of either in his own time, when the mean vernal equinox was falling on March 28, and the mean winter solstice on Dec. 27. But if we refer to our Fasti Catholici, B. C. 686, we shall see that they were exactly the mean dates of both for that particular epoch; with no difference but *this;* that a given Julian date March 29, for Eudoxus' time, was March 30 for that time, and Dec. 28 in his time was Dec. 29 then*. The Julian date of the mean vernal equinox B. C. 686 was March 30, and that of the winter solstice was Dec. 29. In our opinion this is the most probable and most consistent explanation of Eudoxus' adoption of these dates; so different from the actual dates of

* In B. C. 398 for the meridian of our Tables we have the mean vernal equinox, March 28, 13h. 17m. 2s. 24th.
and the mean winter solstice
Dec. 27, 11h. 38m. 40s. 12th.
B. C. 686, we have the mean vernal equinox, by the Tables,
March 29, 18h. 39m. 57s. 36th.
and raised twenty-four hours, 11m. 9s. 36th.
March 30, 18h. 51m. 7s. 12th.
And the mean winter solstice
Dec. 29, 17h. 12m. 45s. 0th.

the same things in his own time, in these two instances at least. It might be supposed perhaps *a priori* that, if he did not take these dates from the actual dates of his own time, he would have taken them from the sphere of Mazzaroth, with which he might have become acquainted in Egypt. But in that sphere the stated date of the mean vernal equinox before B. C. 672 was March 31, and afterwards March 30: and that of the mean winter solstice, before B. C. 672, was December 30, and after was Dec. 29: and though these approximate to Eudoxus' dates, they are not the same with them.

There was no doubt some particular reason for his fixing upon these two dates, March 29 and Dec. 28; yet not as derived from the sphere of Mazzaroth *per se*, or from the relation of the tropical sphere to that in his own time: and a reason affecting only the vernal equinox and the winter solstice, and the date of each. For it is another remarkable circumstance of the system of Eudoxus, that his date of the summer solstice, as we are able to prove, was attached to June 26, and his date of the autumnal equinox to Sept. 26: neither of them exactly in agreement with the truth in his own time, yet neither of them consistent with March 29 as the date of the vernal equinox, nor with Dec. 28 as that of the winter solstice; and neither of them taken from the calendar of Mazzaroth, which would have prescribed June 30 for the one, and Sept. 29 for the other. We should be altogether of opinion, that his choice of these two principal terms, (one the most important for a type of the octaëteris destined to bear date at or about the vernal equinox, and the other for one intended to bear date at or about the winter solstice,) was determined by the matter of fact, with respect to each, B. C. 686.

It will be seen too that B. C. 686 there was a solar eclipse Oct. 30, 8.45 P. M. (Paris), the first ecliptic new moon of the xth Sarus in the Egyptian cycle, and one of those in the first of the cycle of Eudoxus; from which it is easy to calculate that the mean new moon of December would fall Dec. 28, 22 h. 13 m. 5 s. for the same meridian, and Dec. 29, 0 h. 8 m. 46 s. for the meridian of Heliopolis; almost on the date of the mean winter solstice of the same time. And this too would

be an important coincidence to an octaëteric cycle, destined to be attached to Dec. 28; if Eudoxus was actually meditating any thing of that kind. Between Dec. 29, B. C. 686, and Dec. 28, B. C. 382, there were 304 years (=38 cycles of eight years complete); in which time the mean lunar date in question must drop from Dec. 29 to Dec. 28.

That Eudoxus resided at Heliopolis while he was in Egypt, may be inferred from the fact mentioned by Strabo [p]; that his observatory at Heliopolis was still pointed out in Strabo's time: just as much as that in Cnidus, his native island [q], from which, according to Posidonius, he was accustomed to watch the star Canopus. Heliopolis therefore even in his time was still the principal school of astronomy in Egypt; and the observations and records which he met with in Egypt must have been kept there. He was well acquainted with the Egyptian language; if, as Diogenes informs us [r], he was said to have written dialogues in Egyptian himself, or to have translated Egyptian dialogues into Greek. Plutarch indeed tells us, both he and Plato were disciples of *Χόνουφις* of Memphis [s], as Solon was of *Ψένωφις* of Heliopolis, and of *Σόγχις* or *Σώγχις* of Saïs; and Pythagoras of *Οἴνουφις* of Heliopolis. But Diogenes distinctly attests [ss] that his master was an Heliopolite, and of the same name as this *Χόνουφις* of Memphis in Plutarch, Ἰ*χόνουφις* or Ἰ*χόνουφυ*: and the fact mentioned concerning his observatory at Heliopolis confirms Diogenes. Strabo too, describing Heliopolis, insists particularly on the still remaining vestiges of the school or college of priests and astronomers once domiciliated there [t]: Ἐ*ν δὲ τῇ* Ἡ*λιουπόλει καὶ οἴκους εἴδομεν μεγάλους ἐν οἷς διέτριβον οἱ ἱερεῖς· μάλιστα γὰρ δὴ ταύτην κατοικίαν ἱερέων γεγονέναι φασὶ τὸ παλαιὸν, φιλοσόφων ἀνδρῶν καὶ ἀστρονομικῶν. ἐκλέλοιπε δὲ καὶ τοῦτο νυνὶ τὸ σύστημα καὶ ἡ ἄσκησις.* We admit however that Memphis was much the more considerable place of the two at this time; and that they were so near to each other [u], that an Heliopolite might well pass for a Memphite.

[p] xvii. 1. [q] ii. 5.
[r] Lib. viii. cap. viii. Vita, iii. § 89.
[s] De Iside et Osiride, x. Cf. De Genio Socratis, vii: Solon, xxvi.
[ss] Lib. viii. cap. viii. § vi. 90.
[t] xvii. i.
[u] Twenty miles (Roman) according to Augustin, Opp. iii. Pars i. 411. E. Quæstiones in Gen. i. 135. Cf. Josephus, De Bello, vii. x. 3: Herod. ii. 7: Diodor. Sic. i. 57: Arrian, De Expeditione Alex. iii. 1.

Of the ardour with which Eudoxus devoted himself to his favourite science of astronomy, we may form some idea from the casual observation of Plutarch [w]: Εὐδόξῳ δὲ καὶ Ἀρχιμήδει καὶ Ἱππάρχῳ συνενθουσιῶμεν... : and still more from the wish which he attributes to him, to get as near to the sun as Phaëthon had done, even though so near a prospect should cost him his life, as it had done Phaëthon: Εὔδοξος δ' ηὔχετο παραστὰς τῷ ἡλίῳ καὶ καταμαθὼν τὸ σχῆμα τοῦ ἄστρου καὶ τὸ μέγεθος καὶ τὸ εἶδος ὡς ὁ Φαέθων καταφλεγῆναι [w].

With regard to his works; it does not appear to have been known to Suidas [x] that he left any thing behind him except compositions on the subject of astronomy, in prose and in verse. Nor are writings of any other description attributed to him by Diogenes Laertius, except in very general terms: Ἕτερ' ἄττα ἀξιόλογα; and κατέλιπε δὲ καὶ ὑπομνήματα κάλλιστα [y]. He was however a physician by profession [z], and a geometer as well as astronomer; and, at the request of his countrymen of Cnidus, he drew up a Politia or a code of laws for them [a]. So that he probably wrote on a variety of subjects. From the Nicomachean Ethics of Aristotle [b] it is certainly to be inferred that he wrote on the Sovereign Good: probably on morals in general. But, as it appears from Plutarch, his favourite subject was astronomy [c]: Οὐ Θάμυρις περὶ ἄλλα μουσοποιεῖ καὶ...Εὔδοξος καὶ Ἀρίσταρχος καὶ Ἀρχιμήδης. His astronomical works, called Ἔνοπτρον and Φαινόμενα respectively, we shall have occasion to notice by and by.

We should be of opinion that the ecliptic cycle, of which we have endeavoured to give an account, was incorporated in the ὀκταετηρὶς, ascribed to him by Diogenes Laertius as we have seen. It is a singular circumstance that, in the Isagoge of Achilles Tatius ad Arati Phænomena, an ὀκτωκαιδεκαετηρὶς is attributed to him; if the present reading is not a corruption for that of ὀκταετηρίς: Λέγεται δὲ ἐνιαυτὸς ἡ ἀπὸ τοῦ (αὐτοῦ?) ζωδίου ἐπὶ τὸ αὐτὸ ἀποκατάστασις αὐτοῦ (the sun) ἐν ἡμέραις τξε´ καὶ ἐλαχίστῳ μορίῳ. ἀπὸ δὲ σημείου ἐπὶ σημεῖον ἀποκαθίσταται ἐν ὀκτωκαιδεκαετηρίδι· εἴ γε γνήσιόν ἐστι τὸ σύγγραμμα Ἐρατοσθένους· οὗτος γὰρ ἀνέγραψεν, δεικνὺς ὡς οὐκ εἴη Εὐδόξου [d].

w Non posse suaviter vivi, &c. cap. xi.
x In nomine.
y Vita, loc. cit. iii. § 89. z i. § 86.
a Ibid. iii. § 89. Plutarch, adv. Coluthum, cap. xxxiii.
b Lib. i. cap. xii; x. cap. ii.
c Non posse suaviter, &c. cap. xi.
d Uranologium, 139. E. § 19.

The meaning of this observation appears to be, that Eratosthenes wrote or composed this Octodekaëteris over again; shewing thereby that Eudoxus had not composed any. And we do find an Octaëteris attributed to Eratosthenes, but not an Octodekaëteris. Yet the period of 18 years is that of the ecliptic Sarus: and the ultimate foundation of this remark of Achilles Tatius may be that Eudoxus had written both on this period of 18 years, and on the period of 8 years, on the same occasion and in the same work.

A work too is often quoted by the ancients, ascribed to a certain Eudoxus, and entitled Περίοδος or ἡ Περίοδος, sometimes absolutely and simply in that manner, sometimes with the qualification of γῆς Περίοδος: which latter mode of designating such a work shews it to be meant of some geographical work, or *orbis descriptio*; like the still extant ones of Dionysius Periegetes and others, in the collection entitled Geographi Minores. This geographical Periodus we do not find ascribed to Eudoxus of Cnidus by name, except by Sextus Empiricus [e]: Ὡς Εὔδοξος ὁ Κνίδιος ἱστορεῖ ἐν τῷ πρώτῳ τῆς Περιόδου. Nothing would be more appropriate to such a cycle of eclipses as we have described above, than the title of Ἡ περίοδος absolutely; and as the author of the Geographical periodus seems to have been after all a different person from Eudoxus the Cnidian, we think it extremely probable that if the latter too was the author of a Περίοδος, it was of one of this kind, a Περίοδος or cycle of Sari and eclipses; such as we have endeavoured to explain above. It is a critical coincidence with reference to that question, that according to Ptolemy [ee], if any name was given to this cycle of Sari at first and by its first discoverers, it must have been that of "the Period:" Ἐκάλεσαν δὲ τὸν χρόνον τοῦτον περιοδικὸν, ὡς πρῶτον εἰς μίαν ἀποκατάστασιν ἄγοντα ἔγγιστα τὰς διαφορὰς τῶν κινήσεων. The Chaldæans tripled the cycle, and gave it in that form the name of the "Evolution." The discoverers of the simple period, whosoever they were, must have called it simply "the Period:" and if that was the case, Eudoxus would naturally write of it under that title also *.

* It appears from Diogenes Laertius' Life of Eudoxus, (lib. viii. ch. viii. sect. v. § 9. 9), that he knew of three writers of this name, Eudoxus of

[e] i. cap. 14. Pyrrhon. Hypotyp. p. 39. § 152.

[ee] Magna Compositio, iv. cap. ii. 216.

Section IX.—*On the sphere of Eudoxus.*

Long as we have dwelt on the Phœnix cycle of the Egyptians, and on the subjects connected with it, we cannot take

Cnidus, Eudoxus of Sicily, a comic poet, and Eudoxus of Rhodes, whom he designates as an historian, *ἱστορίας γεγραφώς*. This latter might be a writer on geography also.

An Eudoxus is mentioned by Strabo (lib. i. ad princip.) along with other writers on geography, Anaximander, Hecatæus, Democritus, Dicæarchus, Ephorus. And again (lib. ix. ad princip.), as *ἀνὴρ μαθηματικὸς* and *σχημάτων ἔμπειρος καὶ κλιμάτων* (cf. also, viii. cap. vi. 211: ix. cap. 2. Eustathius ad Dionysium Perieg. Geog. Min. iv. p. vii. l. 14 ad sin.: cf. ix. 35 ad sin.); but he does not call him Eudoxus of Cnidus: and when he mentions Eudoxus, in his account of Cnidus (xiv. cap. ii.), he describes him too as Εὔδοξος ὁ *μαθηματικὸς*, but not as the geographer. In fact the geographer of the name of Eudoxus is called by Marcion of Heraclea, (Geographi Min. i. p. 63. Cf. ii. v. 110–126. ii. Agathemerus, lib. i. p. 2,) Eudoxus ὁ Ῥόδιος, the same whom Diogenes Laertius designated as the historian.

Ἀρκάδες οἳ καὶ πρόσθε σεληναίης ὑδέονται.

Apollonius Rhod. iv. 264.

Schol.: Ὡς καὶ Εὔδοξος ἐν τῇ Περιόδῳ. Cf. Scholia ad Arist. Nubes, 397, *βεκκεσέληνε*: Οἱ Ἀρκάδες δοκοῦσι πρὸ τῆς σελήνης γεγονέναι, ὡς καὶ Εὔδοξος ἐν τῇ Περιόδῳ. Scholia ad Hom. Odyss. Λ. 239: of the river Axius, and the reading of αἴᾳ for αἶαν: Φέρει δὲ τὸ ἔπος καὶ Εὔδοξος ἄνευ τοῦ ν.

Ἀξίου, οὗ κάλλιστον ὕδωρ ἐπικίδναται αἴᾳ.

Ταῦτα μὲν οὖν Εὔδοξος ἐν τῇ δεστέρᾳ τῆς Περιόδου λέγεσθαί φησιν οὕτως ὑπὸ τῶν ἱερέων: Plut. De Iside et Osiride, vi—Ἢ τὰς περιόδους Εὔδοξος[e]: Idem, Non posse suaviter vivere nisi sapientem, cap. x—Φησὶ δὲ τοῦτο καὶ Ἕρμιππος ἐν τῷ πρώτῳ περὶ Μάγων, καὶ Εὔδοξος ἐν τῇ Περιόδῳ, καὶ Θεόπομπος ἐν τῇ ὀγδόῃ τῶν Φιλιππικῶν: Diogenes Laertius, Procem. vi. 8—Περὶ οὗ φησιν Εὔδοξος ἐν Γῆς Περιόδῳ: Ibid. lib. viii. cap. viii. sect. v. 90—Ὥς φησι καὶ Εὔδοξος, ἐν τῇ πρώτῃ τῆς Περιόδου: Ibid. ix. cap. xi. sect. ix. § 83. Pyrrho —Ἔστι δὲ Σκυθῶν τὸ τοιοῦτον (to sacrifice to a sword) καθάπερ Εὔδοξος ἐν δεστέρᾳ τῆς Περιόδου λέγει: Clemens Alex. Protrepticon, v. § 64. p. 56.

[e] It is very observable that, in this instance, the plural number is used in the allusion to the Periodus in question, and not the singular: τὰς Περιόδους not τὴν Περίοδον. The phrase in full is ἢ ὡς τὰς Περιόδους Εὔδοξος ἔγραψεν. Plutarch is speaking of a subject elevated and dignified in itself, still further recommended and supported by a style and a manner worthy of it. We have met with no allusion to the geographical Periodus under the name of "*the Periods*," absolutely; though there are many to it still in existence, as "the Period." But if it be true, as we have collected from Ptolemy, that the proper name given at first to the ecliptic Sarus was that of "the period;" every Sarus would be such a period, complete and independent in itself: and sixteen of them, like that complex of Sari of which we are speaking, would be a collection of such periods, which might be, and probably would be, alluded to absolutely and all together, as "*The periods.*"

our leave of it finally without saying something concerning one more question of the same kind, on which the opinions of the learned have been much divided; and upon which it would never perhaps be possible to come to any satisfactory

l. 4—Ἰστέον δὲ ὅτι Ἡρόδοτος τοὺς Ἀρμενίους Φρυγῶν ἀποίκους φησί... καὶ Εὔδοξος δὲ ἐν Γῆς Περιόδῳ φησίν· Ἀρμένιοι τὸ γένος ἐκ Φρυγίας, καὶ τῇ φωνῇ πολλὰ φρυγίζουσι. παρέχονται δὲ καὶ λίθον τὴν γλύφουσαν καὶ τρυπῶσαν τὴν σφραγῖδα: Eustathius ad Dionys. Perieg. ver. 694. Geographi Min. iv. p. 124—Λιπάρα· μία τῶν καλουμένων Αἰόλου νήσων περὶ τὴν Σικελίαν ἡ Λιπάρα, ὡς Εὔδοξος, ζ′ Περιόδου: Harpocratio, Λιπάρα—Εὔδοξος δὲ ἐν τῷ θ′ τῶν ἱστοριῶν τὸ πέλαγος καὶ τὴν πόλιν ὀνομασθῆναι Ἀδρίαν φησίν: Etymolog. Magn. 17, Ἀδρίας — Βοῦς Κύπριος...σημαίνει δὲ ἀτοπίαν τῶν Κυπρίων. καὶ Εὔδοξος ἀφηγεῖται ὅτι κοπροφαγοῦσιν: Hesychius, i. 754. Cf. ii. 315. Κόπριος· τῆς Κύπρου: Parœmiographi Græci p. 21: Prov. ε′, Cod. Bodl. 222: Βοῦς Κύπριος εἶ: Scholia ad Aristoph. Plutum, 706. Porphyry also, Vita Pythagoræ, quotes the 8th book.

It thus appears that some Eudoxus was the author of a geographical work in seven or eight books at least, entitled Γῆς Περίοδος: who does not seem to have been Eudoxus of Cnidus, and was most probably Eudoxus of Rhodes the historian. The title itself is much older than either of these could be supposed to have been. Hecatæus of Miletus was the author of a Περίοδος τῆς γῆς too: Harpocratio, Καλαυρία: and of a work called Περιήγησις, a distinct one apparently from that: Ibid. Ῥοδωνία. Cf. also Eusebius, Evangelica Præp. x. 3. 459. § 16. Ex Porphyrio. A Γῆς Περίοδος is attributed to Dicæarchus too: Lydus, De Mensibus, iv. 68. p. 98. 17.

When we read in Cicero De Republica (i. p. 19), that the eclipse of the sun, recorded in the Annales Maximi and mentioned by Ennius, on the nones of June, U. C. 350 or 351, was made the basis of calculations backwards up to the eclipse at the death of Romulus; we can scarcely doubt that the ecliptic period of the Sarus must have been used for that purpose. When we read, in like manner, in Censorinus, cap. xxi. that the details of the historical æra, supposed to begin at the epoch of the Olympiads, were discussed and reduced to chronological order by Varro, not only through the careful collation of historical testimonies and of other data, but also by means of *eclipses*; we must conclude that he too made use of the Sarus for that purpose: particularly if, as Censorinus observes, by those means not merely the number of years, but even of days, between such and such points of time had been determined by him: Eruit verum, lucemque ostendit per quam numerus certus non annorum modo sed et dierum perspici possit. This was possible of the interval between two given eclipses, and with the assistance of the Sarus; but not in any other way.

It may be made to appear that Varro, and his contemporary and friend Tarrutius, were actually engaged on an investigation, B. C. 54, which carried them back to B. C. 772 and to an eclipse of that date: and that was only four years short of the Olympic epoch, B. C. 776. The Olympic

conclusion, without the knowledge of those facts which the history of the Phœnix period and of the primitive sphere alone brings to light: we mean the nature of the sphere of Eudoxus.

epoch, B. C. 776, is the date of the vth cycle of the series of Sari from B. C. 848 downwards: and the date of the cycle before that, B. C. 794, would be the date of the second cycle of the ἐξελιγμὸς reckoned from B. C. 848 too. If the scheme of Sari of which Varro was in possession went back to B. C. 776; it is not too much to suppose that it went back to B. C. 794 also.

The two principal eclipses of that Sarus were August 11 and August 26, the former of the moon, the latter of the sun. A Greek parapegma or calendar is extant, which heretofore existed only in Latin; and was commonly considered to be a Latin version of the *Apparentiæ* of Ptolemy, by Nicolaus Leonicus; though it differed in too many respects from that to have deserved to be so considered. The reader may see it in the Uranologium of Petavius (pag. 92 sqq.). But it has lately been recovered in the original Greek; and has been published along with the other remains of Lydus, in the Corpus Historicorum Byz. p. 357 sqq. And by Lydus it is ascribed to a Claudius Thuscus; who compiled it from various sources; and among others, from the Ἱερὰ of the Etrurians. We may have occasion to notice this more particularly at some future opportunity; and may take advantage of that to state what we have been able to learn concerning the author.

There are many extraordinary things in this calendar, which probably had a meaning when they were first inserted in it, though it is difficult to divine that meaning at present. Among these is an entry, opposite to iv id. August: Ἐν ταύτῃ τῇ ἡμέρᾳ ἔκλειψις σεληνιακή: and another of the same kind, opposite to viii kal. October: Ἔκλειψις σεληνιακή. Nothing of this kind occurs in any other part of the calendar. What could be more unaccountable at first sight than an eclipse, in a calendar like this, attached to a stated date, as if it were a regular phenomenon, like the rising or setting of a star, at a stated time of the year and on a stated day? And yet it would not be right to condemn even two such entries as these as totally unmeaning and absurd, without first inquiring whether they might not possibly be explained.

In the first place, one of these entries being dated August 10 Roman, and the other September 24 Roman, it is manifest that they are just 45 days asunder; that is, one lunar month of 30 days and an half: so that if there was a new moon on August 10, there might be a full moon on Sept. 24; or if there was a full moon on August 10, there might be a new moon on September 24. On this principle, if we had read ἔκλειψις σεληνιακὴ opposite to August 10, and ἔκλειψις ἡλιακὴ opposite to September 24, there would so far have been no inconsistency between them; and it is obviously possible that ἡλιακὴ might get corrupted into σεληνιακή. This correction of the text of the calendar would necessarily lead to an-

If we except the sphere attributed to Chiron, and that which passes by the name of Empedocles' [f]; the oldest sphere among the Greeks, according to Cicero, De Republica, professed to be the work of Thales of Miletus; and next to his,

other. It is possible for a lunar eclipse to be followed by a solar eclipse in 15 or 16 days' time, but not in 45. The two principal eclipses in our scheme of Sari *supra*, from the ist to the xxviith, that is, from B. C. 848 to B. C. 379, exhibit this phenomenon regularly. We must therefore of necessity conclude that if these two entries in the calendar of Claudius Tuscus ever had a meaning, and one was to be understood of a lunar, the other of a solar, eclipse; the second entry has got out of its place: and instead of being attached to viii kal. Octob. (Sept. 24 Roman) it ought to have been, and must have been, originally attached to viii kal. Sept. (Aug. 25 Roman.)

Now this correction is confirmed, or may reasonably be suppoed to be confirmed, by the testimony of the Constantian calendar of the date of A. D. 355. There is in that calendar opposite to v kal. Sept. an entry, "Solis et lunæ," with the ellipsis of *sacrum*. This day was consequently the stated date of some *sacrum* to the sun and the moon in conjunction. The sun and the moon are always in conjunction at a solar eclipse: and if by any means the v kal. Sept. had come to be associated in any particular manner with solar eclipses, before this *sacrum* was consigned to the calendar, we should account for the entry which appears there attached to that date. This entry indeed, as it stands, is attached to v kal. Sept. August 28 Roman. But we have it in our power to prove that many dates were consigned to this calendar at a time when the proportion of Roman to Julian dates was one of inequality; and of an inequality in some instances amounting to as much as *three* days. This is especially true of the dates which appear there under the name of *Dies Ægyptiaci*. The calendar or Roman dates in these instances are three days in excess of the Julian. On this principle, v kal. Sept. August 28, solis et lunæ sacrum, here, may really denote August 25, not August 28. And if it did, we should perceive at once that it might be the same thing to all intents and purposes as Claudius Tuscus' date, viii kal. Sept. August 25 also, to which the entry of ἔκλειψις ἡλιακὴ, according to the correction required by the necessity of the case, was found to be attached.

We appear then to have discovered in this parapegma of Claudius Tuscus the stated date of a lunar eclipse, attached to iv Idus Aug. August 10 Roman, and the stated date of a solar eclipse attached to viii kal. Sept. August 25 Roman. The question is, What Julian terms answered to these Roman ones respectively? We hope to shew hereafter that this Parapegma was compiled at a time when the Roman and the Julian dates in question would by no means necessarily be the same, though both might nominally be so; when August 10 Roman might in reality mean August

[f] Fabricius, Bibliotheca Græca, Lib. ii. cap. xii. § ix. 478–488.

that of Eudoxus. Dicebat enim Gallus[g] sphæræ illius alterius solidæ atque plenæ, (in opposition to the hollow sphere invented by Archimedes, the armillary sphere,) vetus esse inventum: et eam a Thalete Milesio primum esse tornatam, post autem ab Eudoxo Cnidio, discipulo ut ferebant Platonis, eandem illam astris cœlo inhærentibus esse descriptam: cujus omnem ornatum et descriptionem sumtam ab Eudoxo multis annis post non astrologiæ scientia sed poetica quadam facultate versibus Aratum extulisse. Nothing indeed at present is known of this sphere, except from this poetical description of it by Aratus, or from the testimony of the commentary on the Phænomena of Aratus by Hipparchus: but so much as is known of it through this latter in particular, it is agreed, may be depended upon as authentic.

As to the Phænomena of Aratus; the above passage from Cicero shews that it was generally understood they were no original work of his, but a paraphrase of one of Eudoxus'; the title of which too was Φαινόμενα: as might be collected from

11 Julian, and August 25 Roman August 26 Julian. And this being assumed to have been actually the case in the present instance, we connect these two dates, one of a lunar the other of a solar eclipse, only 15 days asunder, and both in the month of August, and each proposed as a stated date of such a phenomenon, with the two leading and principal eclipses of the fourth Sarus of the Egyptian cycle, August 11 and August 26, B. C. 794. And this coincidence must do much to authorise the inference that this cycle of Sari must have been known in Italy; must have been used by Varro and Tarrutius, and by the learned in Italy, for its proper purposes: only that its epoch had been purposely assumed B. C. 794 with the 4th Sarus, not B. C. 848 with the 1st; one Sarus, but no more, beyond the historical epoch, the epoch of the Olympiads, B. C. 776. And the two principal or leading eclipses in this cycle being always one of the moon, and one of the sun, the former the prior one in the order of succession, the latter the posterior, yet fifteen days only asunder one from the other; and both these falling in the first instance in August, one on August 11, the other on August 26; we may perceive a reason in that fact why August 11 should have come to pass with the astrologers as the epoch of lunar eclipses; and why August 26 (the date of the first ecliptic conjunction of the entire series too) should have been fixed upon as the stated date of a "solis et lunæ sacrum:" which could never be so proper for any state of the relation between them, as that of the conjunction, nor of any conjunction but this primary ecliptic one, on which the entire series of similar ecliptic conjunctions of later date would appear to depend.

[g] De Republica, i. p. 17. Cf. De Divinatione, ii. 42, 87.

the following allusion of Heraclides of Pontus[h]: *Οὐ γὰρ ἠδύνατο πάντα θεολογεῖν ὥσπερ Ἄρατος ἢ Εὔδοξος, Ἰλιάδα γράφειν ἀντὶ τῶν Φαινομένων ὑποστησάμενος ἑαυτῷ.* But it appears most plainly from the commentary of Hipparchus: *Ἀράτῳ...τῇ γὰρ Εὐδόξου συντάξει κατακολουθήσας, ἀλλ' οὐ κατ' ἰδίαν παρατηρήσας*[i]: which he proceeds to illustrate and confirm by various examples of the fact[k]. And again[l]: *Χωρὶς δὲ τούτων καὶ τὸ κλίμα τοῦ κόσμου (συμφώνως) τῷ Εὐδόξῳ ὑποτίθεται ὁ Ἄρατος. καὶ γὰρ ὁ Εὔδοξος ἐν τῷ ἐπιγραφομένῳ Ἐνόπτρῳ τὸν τροπικὸν τέμνεσθαί φησιν οὕτως ὥστε λόγον ἔχειν τὰ τμήματα πρὸς ἄλληλα τὸν αὐτὸν οἷον ἔχει τὰ ε' πρὸς τὰ γ'*: that is, the longest day was 15 hours long and the shortest night was 9; a proportion which, as it is often observed[m] by the commentators on Aratus, would suit both the parallel of the Hellespont and that of Macedonia[n].

Eudoxus then was the author of two astronomical works, one called *Ἔνοπτρον*, Mirror or Looking-glass; the other *Φαινόμενα*, Appearances or Phænomena. This latter was made the foundation of Aratus' of the same name: *Ἀναφέρεται δὲ εἰς τὸν Εὔδοξον β' βιβλία περὶ τῶν φαινομένων, σύμφωνα κατὰ πάντα σχεδὸν ἀλλήλοις, πλὴν ὀλίγων σφόδρα. τὸ μὲν οὖν ἓν αὐτῶν ἐπιγράφεται Ἔνοπτρον, τὸ δὲ ἕτερον Φαινόμενα· πρὸς τὰ Φαινόμενα δὲ τὴν ποίησιν συντέταχεν* (sc. *Ἄρατος*[o]) &c. Repeated quotations from one or other of these works occur in the commentary of Hipparchus, and in the words of Eudoxus himself[p].

There was one circumstance of difference however between the sphere of Eudoxus, and that which Aratus has described in his Phænomena; viz. that Eudoxus had placed the cardinal points *κατὰ μέσα* of the signs or of the constellations; he placed them *κατ' ἀρχάς*. *Προδιειλήφθω δὲ πρῶτον*, observes Hipparchus[q], *ὅτι τὴν διαίρεσιν τοῦ ζῳδιακοῦ κύκλου ὁ μὲν Ἄρατος πεποίηται ἀπὸ τῶν τροπικῶν τε καὶ ἰσημερινῶν σημείων ἀρχόμενος,*

h Ἀλληγορίαι Ὁμηρικαί, Opuscula mythologica, p. 471.

i Uranolog. 172. E. lib. i. cap. 1.

k Ibid. 173 C–176 D–178 A–181 A. sqq.

l Ibid. 177 E. 178 A. cf. Phænomena, 497. and the scholia.

m See Delambre, Astronomie Anc. Liv. i. ch. x. 109.

n Cf. Achilles Tatius, Isagoge, § 15. Uranolog. 148 B–E.

o Uranolog. 173 C. lib. i. cap. ii.

p Ibid. lib. i. cap. ii. 173 D: 174 A–176 D: cap. iii. 176 E: 177 C–D: cap. v. 179 E: cap. x. 184 A: D: cap. xii. 187 E: cap. xvii. 194 C: cap. xxi. 198 D: lib. ii. cap. iii. 212 E—213 B: cap. vi. 216 A–B: cap. xvi. 227 C–E.

q Lib. ii. cap. iii. 211. E–212 A: 212 C–E.

ὥστε ταῦτα τὰ σημεῖα ἀρχὰς εἶναι ζωδίων· ὁ δὲ Εὔδοξος οὕτω διῄρηται ὥστε τὰ εἰρημένα σημεῖα μέσα εἶναι τὰ μὲν τοῦ Καρκίνου καὶ τοῦ Αἰγόκερω, τὰ δὲ τοῦ Κριοῦ καὶ τῶν Χηλῶν. And again[r]: *Λέγω δὲ ὡς τῶν τροπικῶν καὶ ἰσημερινῶν σημείων ἐν ταῖς ἀρχαῖς τῶν ζωδίων ὑπαρχόντων. εἰ μέντοι γε τὰ εἰρημένα σημεῖα κατὰ μέσα τὰ ζώδια κεῖται, ὡς Εὔδοξός φησι, κ̀, τ. λ.* Hence it is, that the 18° of Pisces is reckoned by Hipparchus the 3° of Aries according to Eudoxus[s].

The word *ζώδιον* is ambiguous, as Geminus observes[t]: and may be understood either of the sign or of the constellation. But its proper and primary meaning is the figure (of an animal of some kind) which represented the sign. We agree with the inference of Petavius[u] from these and similar passages; that the constellations are to be understood in such allusions, not the signs so called: and consequently that the cardinal points in the sphere of Eudoxus were so laid down as to divide or bisect the zodiacal figures in each instance, not the signs called by the same name.

This peculiar characteristic of his sphere is most clearly illustrated and authenticated by the following passages[w]: *Ὅτι δὲ Εὔδοξος τὰ τροπικὰ σημεῖα κατὰ μέσα τὰ ζώδια τίθησι δῆλον ποιεῖ διὰ τούτων. "Δεύτερος δέ ἐστι κύκλος ἐν ᾧ θεριναὶ τροπαὶ γίνονται. ἔστι δὲ ἐν τούτῳ τὰ μέσα τοῦ Καρκίνου*[x]." *Καὶ πάλιν φησί· "Τρίτος δ' ἐστι κύκλος ἐν ᾧ αἱ ἰσημερίαι γίνονται. ἔστι δ' ἐν τούτῳ τά τε τοῦ Κριοῦ μέσα καὶ τὰ τῶν Χηλῶν. τέταρτος δὲ ἐν ᾧ χειμεριναὶ τροπαὶ γίνονται. ἔστι δ' ἐν τούτῳ τὰ μέσα τοῦ Αἰγόκερω."* That is, the solstitial colure on the sphere in question passed through the middle of Cancer and the middle of Capricorn; the equinoctial colure through the middle of Aries and the middle of Chelæ, or Libra.

Now this was a very great anomaly in the time of Hipparchus, when these same colures were passing very nearly through the beginnings of these constellations respectively. *Ἐκφανέστερον δ' ἔτι*, he continues[w], *διὰ τούτων ἀποδίδωσιν. περὶ*

r Lib. i. cap. xi. 185 B.

s i. cap. xii. 188 B.

t Cap. i. 1 A.

u Variæ, ii. cap. iii. p. 72 sqq. cf. Delambre, Astronomie Anc. Liv. i. ch. x. 131.

w ii cap. iii. 212 E–213 A.

x Hipparchus indeed himself appears to have construed Eudoxus' words to mean that his cardinal points fell in the *middle* of the respective *signs*. *Ἐπείπερ*, he observes directly after, (214 E) *ἡ ἀρχὴ τοῦ Καρκίνου κατ' αὐτὸν* (sc. *Εὔδοξον*) *κατὰ μέσον ἐστὶ τοῦ τῶν Διδύμων δωδεκατημορίου*. On the same principle, he reckoned the 18° of Pisces to be the 3° of Aries, according to Eudoxus. This however, as we shall see, was not Eudoxus' real meaning.

γὰρ τῶν κολούρων λεγομένων κύκλων, οἳ γράφονται διὰ τῶν πόλων καὶ διὰ τῶν τροπικῶν καὶ ἰσημερινῶν σημείων, φησὶν οὕτως· "Ἕτεροι δ' εἰσὶ β' κύκλοι τέμνοντες ἀλλήλους δίχα καὶ πρὸς ὀρθὰς διὰ τῶν πόλων τοῦ κόσμου. ἔστι δ' ἐν τούτοις ἄστρα τάδε. α', ὁ πόλος ὁ ἀεὶ φανερὸς τοῦ κόσμου· εἶτα τὸ μέσον τῆς ἄρκτου κατὰ πλάτος· καὶ τοῦ Καρκίνου τὸ μέσον." καὶ μετ' ὀλίγον φησίν· "Ἥ τε οὐρὰ τοῦ νοτίου ἰχθύος, καὶ τὸ μέσον τοῦ Αἰγόκερω." ἐν δὲ τοῖς ἑξῆς φησιν· "Ἐν τῷ ἑτέρῳ τῶν διὰ τῶν πόλων κύκλων κεῖσθαι, σὺν τοῖς ἄλλοις οἷς ἐξαριθμεῖται, καὶ τὰ μέσα τῶν Χηλῶν κατὰ πλάτος, καὶ τοῦ Κριοῦ τὰ νῶτα κατὰ πλάτος."

Astronomers have often had occasion to consider these statements; and they have commonly come to one conclusion concerning them; viz. that the above description could not possibly represent the state of the sphere in Eudoxus' time, but might do so for a time 1000 years before his. Bailly repeatedly asserts[y] that the sphere thus delineated would be true to the heavens for some such time as B. C. 1350, or B. C. 1353: i. e. for that state of the heavens which must have been laid down and represented on the sphere, at the epoch of the second Phœnix period, B. C. 1347.

The number of years from B. C. 1347 to A. D. 1802 is 3148. In this time precession would accumulate to 43° 46′ 58″·915; or 43° 47′. The most critical of the criteria above enumerated is that which speaks of the solstitial colure as passing through the tail of the *Piscis Australis,* and through the middle of Capricornus. Delambre understood this of η Piscium[z]; the longitude of which in 1800 was 10 s. 19°.28′: 49°.28′ east of the solstitial colure; and therefore 5° 41′ more to the east than 43° 47′. And this would set back the sphere of Eudoxus 409 years beyond the epoch of B. C. 1347; i. e. much further back than the date of the second Phœnix period, though not so far back as that of the first.

We do not see however on what principle it ought to be assumed that his colure passed through η Piscium; which is not a star on the tail, but at the beginning of the fin on the back. There are three stars in this constellation, ι θ η *Piscis Australis,* respectively; of which η is the most easternly, ι is the most westernly. And this star, ι *Piscis Australis,* is

y Astronomie Ancienne, Éclaircissemens, Livre vi. § vi. 424: ix. § xviii. 490: § xxxvii. 510: § xxxviii. 511. Cf. Delambre, Astron. Anc. liv. I. ch. x. 106 sqq.

z Ibid. i. p. 135.

actually near the tail: and to judge from its position, it would be altogether such as might have been cut by the colure of Eudoxus in the manner supposed by him. The longitude of this star, A. D. 1690[a], was 10 s. 12° 54′ 28″; and A. D. 1802, according to our Tables, it would be 1° 33′ 27″·788 greater; i. e. 10 s. 14° 27′ 55″·788: or 44° 27′ 55″·788 east of the solstitial colure. And this differs so little from the precession, accumulated between B. C. 1347 and A. D. 1802, 43° 47′, that every one must admit, if this star, A. D. 1802, stood 44° 27′ 56″ east of the solstitial colure, B. C 1347 it might have stood on that colure itself. It is easy to see too, from the globe, that the colure which passed through ι *Piscis Australis* at a given time must also have passed through the middle of Capricorn (the constellation so called, not the sign) at the same time. Nor is there any difficulty in verifying the whole of the description of Eudoxus, relating to each of the colures, both the solstitial and the equinoctial, by means of this same sphere of the epoch of B. C. 1347; with quite as much exactness as can reasonably be expected. We conclude therefore that the sphere described by Eudoxus was actually this of the epoch of B. C. 1347 *.

The colures being great circles which pass through the tropical and the equinoctial points as well as the poles; it is impossible that they should ever pass through any but the first degrees of the proper *signs*. The colures, with respect to the tropical or moveable sphere, could never occupy any but one

* The sphere ascribed to Empedocles, (Fabricius Bibl. Græca, tom. i. p. 478. lib. ii. cap. xii.) was most probably the sphere of B. C. 847. At least in that sphere the summer solstice was placed in the middle of Cancer: v. 16.

[b]Μέσος δὲ θερινaῖς ἐν τροπaῖσι Κάρκινος
[c]Διδύμων ἔνερθεν προσθίων κεῖται ποδῶν.

The middle star of Cancer being assumed to be δ Cancri, the Asellus Australis, its longitude in 1690, according to Flamsteed, was 124° 23′ 40″; and therefore, A. D. 1802, 125° 57′ 8″. The precession, from B. C. 847 to A.D. 1802, being assumed at 36° 49′ 44″, the longitude of this star, B. C. 847, would be 89° 7′ 24″: i. e. it must have stood as nearly as possible on the solstitial colure.

[a] Flamsteed, opp. iii. Catalogus Brit. p. 36. Delambre, Astron. Anc. tome ii. p. 283. liv. iv. ch. vii.

[b] Legitur μέσaις.

[c] Legitur διδύμοις.

position. It would be absurd therefore to suppose Eudoxus to have spoken of their passing through the middle of Cancer or the middle of Capricorn, or through the middle of Aries or the middle of Chelæ, in the sense of the signs. But with respect to a fixed and immoveable sphere, like that of Mazzaroth, the case would be very different. As referred to that, the colures would be liable to occupy any conceivable position: as many as the equinoctial or tropical points themselves. This distinction however of the moveable and the immoveable sphere of antiquity never yet having been known to the learned; it is incredible that there should have been so much difference of opinion concerning the right construction of Eudoxus' language in the above descriptions of his sphere. What could possibly be meant by the equinoctial colures' passing through the middle of Aries, or by the solstitial colures' passing through the middle of Cancer; but one of two things? the middle of the signs so called of the immoveable sphere, or the middle of the constellations so called of the tropical sphere? The third hypothesis, the middle of the signs so called of the moveable sphere, is excluded by the nature of the case: for the colures, under no circumstances, could pass through the middle of them. And nothing having hitherto been known by learned men of the signs of the immoveable sphere; what ought they to have supposed Eudoxus to mean, but the constellations of the moveable sphere?

Besides this, (as every scholar, and every astronomer must allow,) though such language as *τὰ μέσα τοῦ Κριοῦ, τὰ μέσα τῶν Χηλῶν, τὸ μέσον τοῦ Καρκίνου, τὰ μέσα τοῦ Αἰγόκερω, τὸ μέσον τοῦ Αἰγόκερω*, might be very proper to describe and particularize the intersection of such circles as the colures with the zodiacal figures; it would not be proper to describe and specify the points of their intersection with the signs. *Τὰ μέσα τοῦ Κριοῦ*, the middle parts of the Ram, and *τὸ μέσον τοῦ Καρκίνου*, the middle part of the Crab, would be proper enough for the middle part of the zodiacal figure so called; but not for the 15th degree of Aries the sign, or the 15th degree of Cancer the sign. Is it not evident too that *τὸ μέσον τοῦ Καρκίνου*, in one of these instances, must mean just the same thing in reference to that, as *τὸ μέσον τῆς Ἄρκτου* in

reference to that? And if this last means a constellation, so must the former do likewise. What can be intended by *τὰ μέσα τῶν Χηλῶν κατὰ πλάτος*, or *τοῦ Κριοῦ τὰ νῶτα κατὰ πλάτος*, but the constellations so called? What astronomer, ancient or modern, ever spoke of *τοῦ Κριοῦ τὰ νῶτα*, in the sense of the sign?

We are entirely therefore of the opinion of those learned men, who have collected from Eudoxus' description of his own sphere, that the cardinal points in it bisected the constellations, not the signs called by the same names; passed through them at least somewhere about the middle: for it is not necessary to suppose that they must have bisected them critically in every instance. It follows that the sphere which he described must have been that of B. C. 1347; and the most critical proof of that fact, as we have observed, is the relation of his solstitial colure to ι Piscis Australis, the star in the tail of the southern fish—which B. C. 1347 must have been standing as nearly as possible on that very colure.

It is clear from his description, that the names of the signs, of the zodia, and of the constellations, and the figures too corresponding to each, were all in existence and all laid down on the sphere which he described. At first sight, this may appear a difficulty: particularly when we reflect that names were given to the signs first only in B. C. 1347, and that zodiacal figures were represented on the sphere first only in B. C. 848 or 847. But it is really no difficulty. Nothing was easier than to transfer the figures, corresponding to the names imposed in B. C. 1347, from the sphere of B. C. 848 or 847 (when they too were first delineated upon it,) to the sphere of B. C. 1347; to which such figures would appear to belong, as well as the names which denoted them, from the first. And we may take it for granted that the Egyptians would do this: and would delineate the sphere of B. C. 1347 with the zodia as much as that of B. C. 847.

And here we cannot but notice the following coincidence: viz. That had such zodiacal figures been actually represented on the sphere in B. C. 1347, when names were first given to the signs, proportionally to the manner in which they were actually laid down thereon in B. C. 848 or 847; that is, with

due allowance for the precession from B. C. 1347 to B. C. 847; then the relation of the zodia to the cardinal points would have been such that they must have been bisected by them. B. C. 847 the zodia were laid down in the 23 degrees of the tropical sphere; agreeably to which distinction, B. C. 1347, 500 years before, they must have been laid down in the 16th degrees. Thus the zodion of the Ram, which B. C. 847, was graduated from 353°, B. C. 1347 would have been so from 346°. Consequently the equinoctial colure, in 0° 0′ 0″, would have passed through the middle of the Ram at that time; as Eudoxus' description supposes it to have done.

We think therefore it may very probably be inferred from all these facts that, when Eudoxus was among the Egyptians, B. C. 398 and B. C. 397, they communicated to him neither the original draught of the sphere, of the date of B. C. 1847, nor the last, of the date of B. C. 848 or 847, but the intermediate one, of the date of B. C. 1347; to which not only the names of the signs, properly belonging to it, but the zodiacal figures, and the rest of the constellated figures, which properly belonged only to the sphere of B. C. 847, had been purposely transferred—and in such a manner as to be true of that epoch, but not of the time of Eudoxus. That they must have deceived him therefore, we cannot doubt; and yet not by a sphere which was absolutely false, only by one which was relatively so: by a sphere which was not false for the epoch of B. C. 1347, but only for Eudoxus' own time; a thousand years later. It is agreed that Eudoxus himself was no observer; and therefore that he was not likely to find out the deception which was practised upon him.

And with regard to the motives which might have induced the Egyptians to pass off an obsolete and antiquated sphere upon him; we may easily conceive that they would not communicate either to him, or to any other stranger who came among them, the original sphere of B. C. 1847—lest that should have betrayed the secret of their own fabulous chronology; and they might not choose to make him acquainted with that of B. C. 848 or 847, which embodied their last improvements, lest it should make their own knowledge on such points too promiscuous and cheap. It did not suit their purpose to reveal the true system of their administra-

tion of the sphere to so curious and inquisitive and intelligent a people as the Greeks; towards whom they appear to have conducted themselves, on all occasions, with more shyness and more reserve, than towards any strangers who visited them besides. Be this as it may; the fact itself appears to be certain, that they must have imposed on Eudoxus with an obsolete sphere; a sphere 1000 years too old; a sphere probably agreeing in all respects to that of B. C. 848, except in the time to which it professed to be adapted; the sphere of B. C. 1347 purposely brought down to B. C. 398, in the form externally of that of B. C. 848: which Eudoxus nevertheless seems to have received without any suspicion or distrust; and to have taken with him into Greece, and to have described both in his Ἔνοπτρον and in his *Φαινόμενα* *.

* We have at length, with the blessing of God on our labours, accomplished the principal task which we have hitherto undertaken to perform; viz. to the best of our ability to give a natural, consistent, and satisfactory explanation of that which has always been considered hitherto the most mysterious and inexplicable of the cycles of antiquity—the Phœnix cycle of ancient Egypt. Whether the account itself is actually of this description, we leave to the judgment of our readers: but even should they be of opinion that it is, and even that it leaves nothing to be desired for its completeness; still we must remind them of the observation which we made at the commencement of our inquiries into it, that nothing of this kind ever could have been discovered, or ever could have been explained, without a previous knowledge of the primitive calendar. The success of our inquiries therefore is ultimately resolvable into the mysterious Providence which, after permitting this calendar to be so long lost and forgotten, has permitted it also, in its own time and in its own way, and for its own wise ends and purposes, to be brought to light again and recovered at last. Let the reader unite with us to acknowledge and confess the finger of God, as in all the dispensations of this Providence, so especially in that which concerns the whole course of time from first to last. Let us render to him the entire glory and praise of every discovery which we appear to have made: let us impute nothing to ourselves, but ascribe every thing to him. Let us only derive comfort to our own souls, and confirmation for our common faith, from the unexpected light which these discoveries are found to reflect on the truth of those holy writings upon which we rest all our convictions, and from which we draw all our consolations; and especially on that of the ancient Scriptures, the most abused and misrepresented, and the most perverted from their plain and obvious meaning, of any part of the word of inspiration itself, not indeed by the *philosophy*, but by the *doxosophy* and by the *morosophy* of the present age; by the pseudo-rationalism, by the pseudo-learning, by the pseudo-criticism, and in particular by

the pseudo-chronology and the falsely so called ancient history, of our own day.

The Phœnix cycle was confessedly the oldest and the most interesting of all, which we have yet considered. It may now be regarded as the most important: as bound up indissolubly with the substantiation of truths which men can neither overlook, except by deliberately shutting their eyes against the light; nor wilfully refuse to believe, except at the peril of their own souls. Long as we have dwelt upon it, we have not yet done with it; nor have we pointed out all the uses to which it is subservient. And though the chief of these is unquestionably the testimony which it bears to the true chronology of the present system of things, and to its absolute identity with that of the Hebrew Bible; yet it is calculated also to render an essential service to astronomy; by establishing a very nice and curious, as well as important point, hitherto undetermined, the true mean length of the natural solar or tropical year.

It will probably have occurred to the reader to observe that often as we have had occasion in the preceding dissertation to refer to the phenomena of the natural year, and to make use of some standard of that year for their explanation, we have always made use of the standard of our own Fasti, as if *that* were the mean standard of all past time, the standard adopted and sanctioned by the authors of the Phœnix period itself. That we have done this is true; and yet we have assigned no reason why we have done it: we have no where stated on what grounds we have done it, or by what right we considered ourselves at liberty to take that for granted which evidently required to be proved.

We have not thought proper to stop in the course of the preceding discussions to anticipate or to answer this objection; because we were aware that the course of our inquiries themselves, and the various facts which they would be found to bring to light, would supply the best answer to it at last.

The result of these inquiries has been to establish the following facts: i. That the Phœnix cycle was one of 500 years. ii. That into this cycle a lunar, a solar, and a Julian element of the reckoning of annual time entered alike; so that the cycle itself was one of 500 years of mean lunar time, 500 years of mean solar or natural, and 500 years of mean Julian, at once. iii. That these lunar and solar and Julian elements were assumed to be so related to each other, that mean lunar time fell back in this cycle on mean natural at the same rate as mean natural on mean Julian. iv. That the particular rate of this recession in each instance was 3 d. 21 h. of mean solar time in one cycle of 500 years, twice as much in two, and so on; so that in eight cycles, or 4000 years, the recession of natural solar time on mean Julian in particular would amount to 31 days exactly. These facts appear to us to have been established on competent evidence of their truth; nor do we think that they can be disproved.

What then is the necessary inference from such facts? The standard of the mean Julian year is invariable. It can be neither more nor less than 365 d. 6 h. of mean solar time. Five hundred years of this standard

must contain neither more nor less than 182 625 mean solar days; and 182 625 such days, diminished by 3 d. 21 h. of mean solar time, can contain neither more nor less than 182 621 d. 3 h. of mean solar time also: and 182 621 d. 3 h. of mean solar time, distributed equally among 500 natural years, can give neither more nor less than 365 d. 5 h. 48 m. 50 s. and 24 th. of mean solar time to each. It follows that the standard of the mean natural year, which entered the Phœnix period, must have been this of 365 d. 5 h. 48 m. 50 s. 24 th. of mean solar time exactly. The difference of one mean natural year of the Phœnix standard and of one mean Julian year must have been 11 m. 9 s. 36 th. and no more, perpetually. Now this is the standard, and this is the difference, of our own Fasti. We were well aware that the analysis of the cycle would lead to this conclusion, and would force this conviction at last on every unprejudiced reader; viz. that the mean natural year of our own Fasti, and that of this period, must have been absolutely the same. We might still appeal to other proofs of the same fact; but after this one, we consider any more to be superfluous.

The mean length of the natural solar or tropical year is one of those problems of astronomy which has been for the longest time of any in the course and process of solution; and notwithstanding has never yet been solved: and, if it is to be determined at last by observation only, will probably never be solved by human observation at all. It is not the least surprising and curious discovery which the analysis of the Phœnix cycle brings to light, that the mean natural standard of that period was absolutely the same with that of our Fasti. It is a very obvious question, In what manner is this coincidence to be explained? or, How came the Egyptians, the contemporaries of the rise of the Phœnix cycle, to fix on the standard of *our* Fasti for the use of their particular cycle?

We do not hesitate to declare it to be our opinion that the adoption of this particular standard was not the result of observation. Observation, not even with all the advantages of instruments unknown to antiquity, so various and so perfect of their kind, has never yet been able to determine the standard in question. On what then did it rest, if not upon observation? We answer, in all probability upon *authority*, upon *prescription*, upon *tradition*. It was the standard handed down from the antediluvian to the postdiluvian world. It required but 500 years to carry us back from the epoch of the Phœnix cycle to the flood; and *one* survivor of the flood, and consequently of the antediluvian world, the patriarch Shem, (if not two more, the patriarchs Ham and Japhet,) was still living at the epoch of that cycle. It is but a step back from Shem and Noah to Lamech and Adam: and the traditionary astronomy of the postdiluvian world is connected at once not only with that of the antediluvian world, but also with that of the beginning of things. It would not be surprising therefore that a standard handed down by a tradition like this, and recommended and sanctioned by an authority like this, should have been implicitly received and recognised by the authors of the Phœnix cycle. The question however which it naturally suggests goes much further than this: and the true point for the most serious consideration of men of

science is whether the traditionary standard of the mean natural year, recognised by the antediluvian and by the postdiluvian world alike, on the ground of prescription and authority only, but of such prescription and of such authority as this, must not have been the true mean standard of the natural year itself: for it would be easy to shew that, if we went back to the ultimate origin of such a prescription, it could be found in nothing but the knowledge which must have been directly communicated to the minds of our first parents by their Creator himself.

There *is* such a thing as the mean standard of the natural tropical year; and there always has *been*: whether astronomers have yet succeeded in discovering it or not. It is agreed that the mean motion of the earth in its orbit is invariable. The axis major of the solar orbit is invariable: and while that is the case, the mean time of describing this orbit, (which is in fact the mean motion of the sun (or of the earth) in this orbit,) must be invariable also. It is true that by virtue of the precession, or rather of the constant recession of the cardinal points in the plane and in the circle of the ecliptic, every natural year appears to come to an end and to be renewed sooner than the year before it; but it is only in appearance. The natural year does not fall back on itself; only on some fixed point to which it is constantly referred, one year after another perpetually. It retreats on the circle of the ecliptic annually more and more; and its cardinal points retreat with it, preserving the same relations to each other and to the whole notwithstanding.

It appears to be agreed among astronomers that the only kind of year which is absolutely unchangeable is the mean sidereal year. Its invariability is a necessary consequence of the invariability of other things; which can never be other than they are, while the laws of the solar system remain what they are at present too. It must be evident however that, were there no such effect as precession every year, the mean tropical year would be the same thing with the mean sidereal perpetually. It is precession which makes the difference between them. The mean tropical year + the mean precession is the mean sidereal year; and the mean sidereal year − the mean precession is the mean tropical. It follows that the ultimate standard of reference even to the mean tropical year must be the mean sidereal. The tropical year may be considered as circulating in and upon the sidereal; at stated times coinciding with it, and at other times differing from it. It is most natural to suppose that they must some time or other have begun together; and under such circumstances too, that the first point of the mean tropical year must have been the first of the mean sidereal also, and *vice versa*: in which case the mean tropical year might be regarded ever after as a *variable* sidereal year, and the mean sidereal as a *fixed* tropical year.

The equable year circulates perpetually round the mean Julian. It has its proper cycle of restitution, 1460 mean Julian years and 1461 equable. It circulates also round the mean natural; and it has a similar cycle of restitution in that. There is a similar cycle of restitution of the mean tropical year in the mean sidereal. Nor is it difficult to define its limits.

It is the length of time in which the arc of precession accumulates to 360°; or in which the cardinal points, in their annual motion backwards, describe the entire cycle of the ecliptic from any given point to the same point again. Let this time be assumed to be N years. Then in these N years there will be N mean sidereal years and N + 1 mean tropical years: and the question is only, Among the various standards of the mean natural and of the mean sidereal year, which are or which have been assumed, which are the most competent to answer to these relations the most exactly? We have already pointed out[a] some remarkable properties of our mean standard of the natural year, which appeared to designate it preeminently as the mean standard of natural annual time in constant conjunction with mean Julian: let us see what peculiarities it exhibits in constant connection with mean sidereal.

i. 25885 natural years of this standard contain 9,454,295 days, 15 h. 23 m. 24 s. of mean solar time.

	d.	h.	m.	s.
6000 × 4 or 24000 =	8,765,814	0	0	0
1000 =	365 242	6	0	0
800 =	292 193	19	12	0
80 =	29 219	9	7	12
5 =	1 826	5	4	12
25885 =	9 454 295	15	23	24

ii. If we divide

$$\frac{9\,454\,295 \text{ d. } 15 \text{ h. } 23 \text{ m. } 24 \text{ s.}}{25\,884}$$

by

the quotient is 365 d. 6h. 9m. 9s·567 454 798 331; i. e. it is the mean sidereal year, adapted to this standard of the mean natural. It is the sidereal year which we have ourselves obtained in our Introduction, after a different manner from this, yet with the same result. It is Mr. Baily's standard of the mean sidereal year,

365 d. 6h. 9m. 9s·6

or but inappreciably different from it. It follows that 25884 mean sidereal years of this standard must be exactly equal to 25885 mean tropical of the other standard; and that neither of them can contain a particle of mean solar time more or less than the other.

iii. If we divide 360 degrees by 25884, the quotient is

50″·069 541 029 207 232 267.

It follows that the arc of precession, which makes the whole difference every year between the mean tropical year of this standard and the mean sidereal, is 50″·069 541 029 207 232 267; and that in 25884 years of the one standard, and in 25885 years of the other, it accumulates to 360 degrees, or to one cycle of the ecliptic exactly.

In like manner, if we divide 24 hours, or 86 400 seconds, of mean sidereal time by 25884, the quotient is 3 s·337 969 401 947 148 817 8: and

[a] Dissertation ix. ch. i. sect. viii. vol. ii. 30.

this is the mean annual increment in right ascension, (in the sense of mean sidereal time,) corresponding to the mean annual increase of the arc of precession or of mean longitude; and it accumulates to one complete cycle of the diurnal rotation, exactly in the same length of time as the other to one complete annual cycle of the ecliptic.

iv. It is capable of demonstration also that the mean natural year of this standard is of the same denomination perpetually, whether in mean solar or in mean sidereal time, *mutatis mutandis* only: i. e. this tropical year will contain 365 d. 5 h. 48 m. 50 s. 24 th., or 365 d·24225 of mean solar time, and 366 d. 5 h. 48 m. 50 s. 24 th. or 366 d·24225 of mean sidereal time, perpetually. And this too was perhaps no more than was to be expected *a priori*. The true unit of time, in the sense of the absolute measure of duration, is the diurnal rotation; that is, the revolution of the earth about its own axis, the mean sidereal day: but the true unit of time for the purposes of human or social existence is the noctidiurnal cycle; i. e. the mean solar day. It was to be expected that these should meet, and be comprehended perpetually in some third term; which it thus appears is the natural unit of mean annual time; the mean tropical year of this standard, but of this, as it seems, only.

It follows too that this mean natural year, in mean solar time, divided by the same, in mean sidereal time, will give the absolute length of the mean sidereal day in terms of the mean solar day, at once; and without any intermediate process: and that, whether we assume one year of this kind, or any number of such years, for the purpose of obtaining it. For whether we divide

365 d·24225 = one tropical year in mean solar time,
by 366 d·24225 = one tropical year in mean sidereal time,
or 9 454 295 d·64125 = 25885 mean tropical years in mean solar time,
by 9 480 180 d.64125 = 25885 mean tropical years in mean sidereal time,
the quotient is the same,

0 d·997 269 566 796 293 983,

or 23 h. 56 m. 4 s.090 571 199 800 131 2;

i. e. the mean sidereal day, in terms of the mean solar day: more exactly perhaps than it was ever obtained in any other way.

We recommend these coincidences to the consideration of astronomers; especially of such as are Christians as well as astronomers, and have as great a respect for the truths of the Bible as for the truths of science: though indeed between the truths of science and the truths of the Bible there never was nor ever will be any inconsistency.

DISSERTATION XVI.

On the Mneuis cycle of the Egyptians.

CHAPTER I.

Section I.—*Testimonies of antiquity to the Mneuis.*

i. Μνεῦις[b]: Ὄνομα κύριον θεοῦ Αἰγυπτίου—Ταύτῃ δὲ (sc. τῇ σελήνῃ) τὸν Ἆπιν τὸν βοῦν δὴ λέγω Αἰγύπτιοι τρέφουσι, τὸν δὲ Μνεῦιν τῷ ἡλίῳ[c]—Ἆπις[d]: ....Τοῦτον Αἰγύπτιοι σελήνῃ τιμῶσι, καὶ ἱερὸς ἦν ὅδε ὁ βοῦς τῆς σελήνης, ὥσπερ ὁ Μνεῦις τοῦ ἡλίου.

ii. Τὰ δὲ γινόμενα περὶ τὸν Ἆπιν τὸν ἐν Μέμφει, καὶ τὸν Μνεῦιν τὸν ἐν Ἡλιουπόλει, καὶ τὰ περὶ τὸν τράγον τὸν ἐν Μένδητι[e], πρὸς δὲ τούτοις τὸν κροκόδειλον τὸν ἐν τῇ Μοίριδος λίμνῃ[e], καὶ τὸν λέοντα τὸν τρεφόμενον ἐν τῇ Λεόντων πόλει[e], καὶ πολλὰ τοιαῦθ' ἕτερα, διηγήσασθαι μὲν εὐχερὲς, ἀπαγγείλαντα δὲ πιστευθῆναι παρὰ τοῖς μὴ τεθεαμένοις δύσκολον. ταῦτα γὰρ ἐν ἱεροῖς μὲν περιβόλοις τρέφεται, θεραπεύουσι δ' αὐτὰ πολλοὶ τῶν ἀξιολόγων ἀνδρῶν, τροφὰς διδόντες τὰς πολυτελεστάτας, κ', τ. λ.[f]

iii. Ὁ δὲ ἐν Ἡλιουπόλει τρεφόμενος βοῦς, ὃν Μνεῦιν καλοῦσιν, Ὀσίριδος δὲ ἱερὸν, ἔνιοι δὲ καὶ τοῦ Ἄπιδος πατέρα, νομίζουσι, μέλας ἐστὶ, καὶ δευτέρας ἔχει τιμὰς μετὰ τὸν Ἆπιν[g]—Οἶνον δὲ οἱ ἐν τῇ Ἡλιουπόλει τιμῶντες τὸν θεὸν[h], κ', τ. λ.

iv. Αὐτοῦ δὲ καὶ ἡ Βουβαστὸς πόλις, καὶ ὁ Βουβαστίτης νομὸς, καὶ ὑπὲρ αὐτὸν ὁ Ἡλιουπολίτης νομός. ἐνταῦθα δ' ἐστὶν ἡ τοῦ Ἡλίου πόλις ἐπὶ χώματος ἀξιολόγου κειμένη, τὸ ἱερὸν ἔχουσα τοῦ ἡλίου, καὶ τὸν βοῦν τὸν Μνεῦιν ἐν σηκῷ τινι τρεφόμενον, ὅς παρ' αὐτοῖς νενόμισται θεὸς ὥσπερ καὶ ἐν Μέμφει ὁ Ἆπις[i].

v. Ἡλίῳ μὲν γὰρ καὶ σελήνῃ βοῦς ἀνιέρωσαν. ἀλλ' ὅ γε ἡλίῳ ἀνακείμενος ἐν Ἡλίου πόλει καλούμενος Μνεῦις βοῶν ἐστι μέγι-

[b] Suidas.
[c] Theodoret, Græcorum Aff. Cur. iii. § 46. p. 124.
[d] Suidas.
[e] Cf. Strabo, xvii. cap. i.
[f] Diodorus Sic. i. 84: cf. 21. 88. Also Eusebius, Præp. Evang. ii. i. § 48. p. 111: § 19. p. 103: § 41. p. 109.
[g] Plutarch, De Iside et Osiride, xxxiii.
[h] Ibid. vi.
[i] Strabo, xvii. i.

στος, σφόδρα μέλας, μάλιστα ὅτι καὶ ὁ ἥλιος ὁ πολὺς μελαίνει τὰ ἀνθρώπεια σώματα. ἔχει δὲ τὴν οὐρὰν παρὰ τοὺς ἄλλους βοῦς, καὶ τὸ πᾶν σῶμα ἀνάτριχον, καθάπερ ὁ ἥλιος τὸν ἐναντίον τῷ πόλῳ ποιεῖται δρόμον· τούς τε ὄρχεις μεγίστους, ἐπειδήπερ ὁ περὶ τὰ ἀφροδίσια ἵμερος γίνεται ὑπὸ θεομότητος, ὅ τε ἥλιος σπερμαίνειν λέγεται τὴν φύσιν[k].

vi. *Ἀλλ' ἄγε δὴ μετάβηθι φαίη ἂν ὁ λόγος, καὶ οὐχ ἵππον μὰ Δία οὐδὲ μὲν τὸν ἐν αὐτῷ λόγον* (reason, rational principle, unless the text is to be corrected by *λόχον*) *ᾆδε, ἀλλὰ Μνεῦιν βοῦν, καὶ τοῦτον Αἰγύπτιοι ἡλίου φασὶν ἱερὸν, ἐπεὶ τόν γε Ἆπιν ἀνάθημα εἶναι σελήνῃ λέγουσιν. ἴδιον δὲ ἄρα καὶ τούτῳ γνώρισμα ἐς τὸ εἶναι μήτε κίβδηλον μήτε μὴν νόθον ἀλλὰ φίλον τῷ θεῷ τῷ προειρημένῳ φασὶν Αἰγύπτιοι. καὶ ὑπὲρ τοῦδε ἐρεῖ ἄλλος· ὃν δὲ ἤκουσα λόγον Αἰγύπτιον ἐς βάσανον τοῦδε τοῦ ταύρου καὶ ἔλεγχον εἴτε ἐστὶ σπορᾶς κρείττονος εἴτε μὴ, τοῦτον εἰπεῖν ἐθέλω*[l].

SECTION II.—*Observations on the preceding testimonies.*

These testimonies are competent to prove that, besides the Apis, there was another bull in Egypt, generally acknowledged and worshipped as divine; that the name of this, according to the Greek form of the proper Egyptian appellation for it, was Mneuis; that it was considered to be sacred to the sun, as the Apis was to the moon; and that it was kept in Heliopolis, as the Apis was in Memphis. It may be inferred too that if this bull was sacred to the sun, and the Apis as much to the moon as to the sun, then this bull must have been the older of the two; because the solar calendar was much older in Egypt than the lunar in the sense of the Apis cycle. And this is still more reasonably to be inferred from the fact mentioned by Plutarch, that in the opinion of some of the Egyptians, (and these, as we shall see, must have been the best informed among them,) even the Apis was the son of the Mneuis. If so, it must have been younger at least than the Mneuis.

It is of little importance therefore to this particular question, that no allusion to the Mneuis, either by name or in any other way, occurs in Herodotus. We cannot necessarily

k Porphyry, apud Eusebium, Præp. Evang. iii. xiii. § 1. p. 252.

l Ælian, De Natura Anim. xi. 11. He proceeds to relate in what manner Bocchoris, king of Egypt, put the divinity of this bull to the test.

infer from this silence, that he could not have heard of the existence of such a sacred Bull. It does not appear that he would have mentioned even the Apis, if the course of the history had not obliged him to do so. There cannot be any doubt that the Mneuis was much older in Egypt than the Apis; and was always esteemed divine in that country. The monuments indeed date the deification of the Apis, the Mneuis, and the Goat, all at once, and under the second of their dynasties: but the authority of the monuments passes with us for nothing. The antiquity of the Apis cycle is decisive of that of the Apis, as the representative of the cycle: and as the former is not older than B. C. 973, so neither can the latter be. But the Mneuis was older than the Exodus. Mneues is mentioned by Diodorus[m] as the most ancient of the legislators of Egypt. He enumerates Sasyches, Sesoösis, Bocchoris, Amasis, and Darius Hystaspis, among those legislators after Mneues; but he mentions none before him. And though we could not necessarily infer from this fact, that there ever was such a person as Mneues among the Egyptians, or ever such a legislator; it is demonstrative of the antiquity or of the supposed antiquity of the name of Mneues at least: and between Mneues and Mneuis, considered merely as names, the difference is only accidental. Nor would it be any thing extraordinary that the oldest of the sacred bulls of the Egyptians, particularly as a person and as divine, should have been traditionally represented as the oldest of their legislators also.

The solar year being so much more ancient in Egypt than the lunar in the sense of the Apis cycle at least; the sun was more likely to become the first object of worship in Egypt than the moon: and consequently the consecration of the Bull to the sun to precede that of the same or of any other animal to the moon. It is agreed that the Mneuis was so consecrated to the sun; and exclusively to the sun: in no sense to the moon as well as to the sun. It is agreed, in like manner, that the Apis was consecrated to the moon, but not exclusively so; not more to the moon than to the sun: the true reason of which community of relation to both was that it was the representative of a lunæsolar cycle; of a lunar in

m i. 94: cf. 95.

conjunction with a solar, or of a solar in conjunction with a lunar, calendar. This lunar and solar Bull then could have no existence before the conjunction of the lunar and the solar calendar in the form of the Apis cycle. But the solar Bull, the Bull sacred to the sun without any similar relation to the moon, must be older than this lunæsolar year in the shape of the Apis cycle; and therefore than the Apis, the representative of such a year. Its antiquity must go back to a time when there was yet no such lunar and solar year in conjunction in Egypt, as that which was represented by the Apis; and yet when there was the same solar year as ever: when consequently such an animal as the Bull might be consecrated to the sun, but not yet to the moon as well as to the sun.

We have already had occasion to draw the attention of our readers to the fact [n] that, at the time of the separation of the two kingdoms of Judah and Israel, in the reign of Rehoboam the son and successor of Solomon, there must have been two sacred bulls in Egypt; one of them the Apis, the other the Mneuis: while at the time of the Exodus there must have been only one—which no one could hesitate to say might have been the Mneuis, but could not have been the Apis. And thus, while the historical existence of the Apis could not be traced beyond the reign of Shishak in Egypt, of Jeroboam the First in Israel, and of Rehoboam in Judah; that of the Mneuis would admit of being attested and authenticated, by contemporary evidence of the most unexceptionable kind, as far back as the Exodus. And unless it could be supposed that the worship of the Mneuis had only just been introduced into Egypt before the Exodus; its existence at the time of the Exodus, and the estimation in which it was held at that time, would be proof that its real antiquity, and its first recognition as divine, in Egypt must have been older than the Exodus at least: and probably much older too.

SECTION III.—*On the Mneuis period; and on the means of ascertaining it.*

It cannot however be denied that from the time of the introduction of the worship of the Apis into Egypt, though the

[n] Diss. xiii. ch. iii. sect. viii. vol. ii. 528.

Mneuis never ceased to be considered and treated as divine, it fell into comparative obscurity; the Apis became the more illustrious and better known of the two, so as almost to eclipse the Mneuis, and to cause it to be overlooked by the strangers who visited Egypt: of which there cannot be a better proof than the list of testimonies which we have begun with producing to the existence and worship, and to the other particulars of the history, of this one sacred animal of the Egyptians, compared with the number, minuteness, and circumstantiality of the similar testimonies which we premised to our Dissertation on the Apis cycle. Various reasons might probably be assigned to account for this distinction; but the principal one appears to have been that the deification and worship of the Apis was associated from the first with Memphis, that of the Mneuis with Heliopolis: the Apis was the tutelary genius and patron of Memphis, the Mneuis of Heliopolis. And whatsoever might be the superior antiquity of Heliopolis, and whatsoever its ancient dignity and importance, there can be no question that from B. C. 973 downwards, (i. e. from the date of the Apis cycle,) Memphis became much the more considerable of the two; and excepting Thebes or Diospolis, which alone, in point of grandeur and population and wealth and importance, was still qualified to contest the palm of precedence with Memphis, it was probably the most considerable city in all Egypt. It is not surprising that the fame and celebrity of the patron of Heliopolis should sympathize with the fortunes of its own city; and in proportion as Heliopolis was eclipsed by the superior renown of Memphis, that the credit of the Mneuis also should be superseded by that of the Apis, in the estimation of strangers at least: for it is certain that among the Egyptians themselves even the Mneuis never ceased to be esteemed and treated as divine.

It is a consequence however of this comparative obscurity of the Mneuis, that we are left to conjecture on many points connected with the history of this Bull, about which we have had the benefit of positive testimony, to inform and direct our inquiries concerning that of the Apis. We have no doubt that there was a proper Mneuis cycle, as well as a proper Apis one; and that this cycle had its proper period.

And though, that there was actually such a cycle among the Egyptians at all, much less what was its actual measure, is not known from the express testimony of any of the ancients; still we are not without the means of determining it, if not with absolute certainty, yet with an high degree of probability.

Now the first clue to the discovery of this cycle, and of its peculiar period, is put into our hands by the mention of a particular period of the Egyptians, which occurs both on the other monuments and on the Rosetta stone; though it has never yet been explained. We shall proceed to notice the testimony of the latter to this period first.

The celebrated monument, which is known by the name of the Rosetta stone, contains several dates; as may be seen from the details of the inscription recorded upon it; for which we refer to Mons. Le Tronne[o]. Its own date is Xandicus or Xanthicus 4, Mecheir 18, in the 9th year of Ptolemy Epiphanes[p], (each answering to March 27, B. C. 196,) the day of the coronation of this Ptolemy at Memphis[q]: a ceremony to which the Alexandrine Greeks gave the name of Ἀνακλητήρια*; though that name does not occur on this stone.

* That the ceremony was called, by the Alexandrine Greeks, Ἀνακλητήρια, appears from Polybius[a]. In the case of the Ptolemy (Epiphanes) to which this account refers, it was a second instance of the kind. He had undergone the ceremony once before, when he came to the throne at his father's death; i. e. as a minor: and now he was undergoing it a second time, on coming of age, or to his majority, at 13 as it appears complete. This is the occasion alluded to by Polybius and commemorated by the Rosetta stone.

Polybius mentions also the ἀνακλητήρια of Ptolemy Philometor, B. C. 169; and Diodorus Siculus refers to another instance of the same ceremony, in the case of Ptolemy Physcon, or Euergetes II, cir. B. C. 145 or 144[b]. Ὅτι Πτολεμαίου κατὰ τὴν Μέμφιν ἐνθρονιζομένου τοῖς βασιλείοις κατὰ τοὺς Αἰγυπτίων νόμους, παῖς ἐγένετο ἐκ τῆς Κλεοπάτρας τῷ βασιλεῖ. ἡσθεὶς δὲ διαφερόντως προσηγόρευσε τὸν παῖδα Μεμφίτην, ἀπὸ τῆς πόλεως καθ' ἣν τὰς θυσίας ἐπιτελοῦντος ἐγεννήθη.

Of the tragical end of this child, whom this same Ptolemy afterwards

o Recueil des Inscriptions Grecques et Latines de l'Égypte, tome i. seconde partie, xxv. 241 sqq. Cf. Egyptian Antiquities in the British Museum, part ii. 114–117.

p Recueil, i. p. 244. l. 4–6. C. Diss. xiii. ch. vi. sect. iv. vol. ii. 581. sqq.

q Ibid. 245. l. 7, 8: cf. 28. 44, 45.

a Lib. xviii. cap. 38. § 3: lib. xxviii. cap. x. § 8, 9.

b xxxiii. 83. cf. Livy. xlvii. 3. and lib. ii.

The principal dates besides this are two more; one the date of the birth of Ptolemy Epiphanes, Mesore 30, the other that of the death of his father, Ptolemy Philopator, and consequently that of his accession to the throne, Mecheir 17: and each of these is specified in the same part of the inscription.

Pag. 250. v. 46. *Καὶ ἐπεὶ τὴν τριακάδα τοῦ Μεσορὴ, ἐν ᾗ τὰ γενέθλια τοῦ βασιλέως ἄγεται, ὁμοίως δὲ καὶ (τὴν τοῦ Μεχεὶρ ἑπτακαιδεκάτην,)*

v. 47. *ἐν ᾗ παρέλαβεν τὴν βασιλείαν παρὰ τοῦ πατρὸς, ἐπωνύμους νενομίκασιν ἐν τοῖς ἱεροῖς, αἳ δὴ πολλῶν ἀγαθῶν ἀρχηγοὶ πᾶσίν εἰσιν, ἄγειν τὰς ἡμέρας ταύτας ἑορ(τὴν καὶ πανήγυριν ἐν τοῖς κατὰ τὴν* Αἴ—)

v. 48. *γυπτον ἱεροῖς κατὰ μῆνα.*

This Ptolemy at his father's death was left a minor, as Polybius informs us[r]: according to Jerome[s], four years old: according to Justin[t], five years old: and this latter statement appears to us to come nearest to the truth. The date of his accession is determined by the inscription to Mecheir 17, the same year; which according to the canon of Ptolemy, and to the rule followed by that, requires to be dated from Thoth 1, Nab. 544, October 13 B. C. 205; that is, Mecheir 17 Nab. 544, March 28, B. C. 204. Let us suppose that he was five years old complete at this time, and that his birthday was Mesore 30. On this principle he was five complete Mesore 30 Nab. 543, B. C. 205; and therefore was born Mesore 30 Nabon. 538 B. C. 210. And this is confirmed by the date of his birth, which may be collected from Polybius; B.C. 210 also *.

put to death at Cyprus, to gratify his revenge on Cleopatra its mother; see Diodorus, xxxiv. cir. B. C. 130: Valerius Maximus, ix. ii. De Crudelitate, Externa, 5: Obsequens, lxxxviii. Liv. Epitome, lix: Justin xxviii. cap. 8 § 13.

* For the date of the death of Ptolemy Philopator, the father of this young king, we refer to Diss. xiii. ch. vi. sect. iv: and to the note at page 583. vol. ii.

It appears from Polybius, xxiii. cap. 16. § 7. that Ptolemy Epiphanes was 25 years old at a time which the context fixes to B. C. 184 or 185: see xxiv. cap. i. § 1. If he was 25 B. C. 185, he was born B. C. 210. On this

r Lib. xviii. cap. 38. § 3: xv. cap. 20. § 2: xiv. cap. 12. § 5.

s In Danielem, cap. xi. opp. iii. 1124.

t Lib. xxx. cap. ii. § 6.

On what day then did Mesore 30 fall B. C. 210? The first of Thoth, Nab. 539, it is seen from our general Tables, fell on October 14 at 18 hours according to the primitive rule, October 15 at midnight according to the Julian, B. C. 210; and therefore the 1st Epagomene, Nab. 538, fell on October 10 at midnight: and the 30 Mesore October 9 at midnight. This must consequently have been the true Julian date of the birth of this Ptolemy, October 9 reckoned from midnight according to the Julian rule, B. C. 210; if the equable date of his birth was Mesore 30 Nab. 538.

Now, among the titles assigned him in the inscription, there is one which recognises him as the lord or master of a period of thirty years, under the name of a *τριακονταετηρὶς* of a certain kind; and very early in the inscription itself[u]: *Βασιλεύοντος τοῦ νέου...κυρίου τριακονταετηρίδων, καθάπερ ὁ Ἥφαιστος ὁ μέγας*: where *Ἥφαιστος* is only the Greek form of the name of the Egyptian Vulcan, or Φθὰς, which nevertheless occurs on this monument in its proper Egyptian form too[w]. There being then no more dates than these two, specified in the inscription as more particularly connected with the personal history of the young king, and distinct from that of his installation or coronation itself, one, Mesore 30, the day on which he was born, the other Mecheir 17, the day on which he came to the throne; it seems only a reasonable conjecture that this title of *κύριος τριακονταετηρίδων* must have been given him from the coincidence of one or other of those events, the event of his birth or the event of his accession, with a period of this description. And forasmuch as the inscription itself implies, in the words just quoted, that he was already the lord of these *τριακονταετηρίδες* when he came to the throne; it is evident that he could not have been made so by the event of his accession: but he might have been by the event of his birth. On this principle, the date of one of these periods of 30 years is determined to the date of the birth of Ptolemy Epiphanes, Mesore 30 Nab. 538 October 9 B. C. 210. And though we should not be justified

principle he would be 13 years old, Mesore 30 Nab. 551 B. C. 197; and 13 years, six months old, Mecheir 18 Nab. 552 (March 27 B. C. 196) when he was crowned.

[u] p. 244. l. 1. 2. [w] 244. l. 4: 245. l. 8, 9: 249. 37: 250. 49.

in assuming this as certain, without further attestation and corroboration of some other kind, we may be allowed to consider it probable, and the natural result of our premises, such as we have stated them. The question is whether this inference admits of being confirmed in any other manner.

Now in the same account of the ancient Egyptian calendar, which appeared in the Dublin University Magazine of August 1846[x], mention is made of an inscription on one of the monuments at Silsilis[y], in which it was expressly stated that the 31st year of Rameses the Great was a year of the great festival of 30 years; that is, it was the first year of one of these *τριακονταετηρίδες*: from which it would follow that his first year must have been so too; and that he must have begun to reign at the beginning of one of these *τριακονταετηρίδες*. Rameses the Great, as we have already observed[y], is a monumental reality but not an historical one. He has an existence on the monuments of Egypt, but not in the history: and on the monuments he is the greatest of monumental kings: he is the Prince Arthur and the Charlemagne of the whole of the monumental romance. Moreover he has a chronology of his own on the monuments also: and though we would not undertake to say that this was uniformly the same, all through the monuments, (for what uniformity could there be of necessity in a purely fictitious system?) yet we believe that he had a recognised æra and epoch on the monuments in general; and that these were purposely assumed to be those of the Sothiacal period.

The epoch of this period however was ambiguous; and it might be assumed either in conformity to the cyclical date, July 22 B. C. 1350, or in conformity to the Nabonassarian, July 20 B. C. 1322. We have seen reason to conclude that the reign of Rameses was dated accordingly, sometimes from the one, sometimes from the other. There can be no doubt however that its true date, if referred to the epoch of the Sothiacal period, must have been July 22 B. C. 1350: and that none of the Egyptians, who were correctly informed on that point, could think of dating it otherwise. Let us therefore assume that this inscription at Silsilis is one of those in which his reign was referred to the epoch of the

x See Diss. xv. ch. vi. sect. xii. vol. iii. 411. y p. 189.

Sothiacal æra; and that too, agreeably to the truth, July 22 B.C. 1350. On this supposition, B.C. 1350 was the first year of a period of 30 years. Now we have seen reason to conclude that B. C. 210 was so too. The interval between these years is 1140 years: and these are equal to 38 cycles of 30 years exactly. So that if B. C. 1350 was the first year of one such cycle, B. C. 210 must have been the first of another; and if B. C. 210 was the first year of one such cycle, B. C. 1350 must have been, or might have been, the first of another. These conclusions therefore are consistent; a *τριακονταετηρὶς* coincident with the epoch of the Sothiacal æra, and with the first year of Rameses the Great according to the monumental chronology, and a *τριακονταετηρὶς*, coinciding with the year of the birth of Ptolemy Epiphanes according to the Rosetta stone.

Let us then in the next place go back from either of these years, either B. C. 210, or B. C. 1350, to the year of the Exodus from Egypt, B. C. 1560. The interval from the former to the date of the Exodus is 1350 years; in which there are 45 cycles of 30 years exactly; and the interval from B. C. 1350 to the same date is 210 years; in which there are seven cycles of 30 years exactly. It follows that, if either of these years was the date of a period of 30 years, the year of the Exodus must have been so too. And thus we should carry back the cycle of these periods of 30 years, from the year of the birth of Ptolemy Epiphanes, B. C. 210, first to the epoch of the Sothiacal period, B. C. 1350, and next to the date of the Exodus from Egypt.

Now though the Bible and the facts of the Bible are the last things which the scepticism of modern times thinks of appealing to for the determination of questions like these, even where its testimony is express, and directly to the point; it is not so with us: and we hope it is not so with any of our readers. We shall therefore at this stage of our inquiries consider ourselves at liberty to take for granted the truth of the Scriptural fact of the plague of the first born in Egypt; and of the declared object and declared effect of that visitation, the destruction of the first born of cattle as well as of men, and the execution of judgment on the gods of Egypt, (of which at this time the Mneuis was one,) as well as on

the Egyptians themselves. We say then that if the year before the Exodus, the year of the ten plagues, and of this tenth and last of all, from B. C. 1561 to B. C. 1560, had been the first year of a Mneuis cycle, the representative of which was a young Mneuis, and just born, and still living up to the time of the Exodus; yet the plague of the first born, on the very eve of the Exodus, by cutting off prematurely the type of the cycle just at its commencement, would break the regularity of the Mneuis cycle, just as the act of Cambyses, B.C. 523, by causing the premature death of the Apis, broke the regularity of the Apis cycle. And it would compel the Egyptians, whether they would or not, if they continued the cycle at all, to find a fresh representative of the cycle, and to begin a fresh reckoning of the cycle in the second year of the cycle; just as the Egyptians of Cambyses' time were compelled to do with the continued representation and the continued reckoning of the Apis cycle. On this principle, though B. C. 1560 might be the common epoch of all these cycles of 30 years later than the Exodus; it would not follow that it must have been the common epoch of any similar series of cycles before the Exodus. On the contrary, what has just been observed renders it certain that, if these cycles had any connection with the Mneuis, and the epoch *de facto* of all which were later than the Exodus was the year of the Exodus, B. C. 1560 itself; the epoch *de facto* of all which were earlier than the Exodus, reckoned backwards, must have been the year before the Exodus, B. C. 1561—or not later than that at least.

Now this being the case, forasmuch as we have ascertained that the Triakontaëteris, coincident with the year of the birth of Ptolemy Epiphanes, had a Julian date Oct. 9; and that the reckoning of these cycles themselves from B. C. 210 to B. C. 1350, and from B. C. 1350 to B. C. 1560, proceeded by periods of 30 Julian years, not of 30 equable or cyclical; we are justified in assuming that the period itself was strictly a Julian period, not an equable one. And its Julian date having been discovered in one instance, it must be considered the same in all; with this difference only, that as every Julian period, in which the cycle of the leap-year is not the same with that of the Julian year itself, must have a

double Julian date, one for the common years of the Julian cycle referred to its own, and another for the leap-years; the proper Julian date even of this period, in some years of its own cycle, must be October 9, and in others, after passing through and being equated to the Julian cycle of leap-year, must be October 8.

The Julian date of the period then B. C. 210 being Oct. 9, let us go back to the time when the first of Thoth was falling on October 9, before the Exodus. We find that year first in æra cyclica 2326, A. M. 2324, B. C. 1681; in which the first of Thoth entered our tables October 8 at 18 hours, according to the primitive rule, October 9 at midnight, according to the Julian*. If we go back no more than one year beyond that, we find the first of Thoth falling on October 9 at 18 hours, according to the primitive rule, October 10 at midnight, according to the Julian.

Now, the distance of B. C. 1681 from B. C. 1561, the year before the Exodus, is just 120 years; in which there would be four cycles of 30 years. On this principle, if the first cycle began October 9 at midnight, B. C. 1681, the fifth would begin October 9 at midnight, B. C. 1561. And if this cycle was broken prematurely, (in its very first year,) in the year of the Exodus, B. C. 1560, its proper commencement *de facto* could not be earlier than October 9, B. C. 1560. And this being assumed as its proper commencement ever after, October 9 B. C. 1560, in the second year of the

* We have often indeed had occasion to observe that Julian dates before and after B. C. 672 would differ by a day: October 9, for instance, before B. C. 672, would be the same thing as October 8 after. It should be understood, on this point, that this distinction is applicable only to the Julian dates of astronomical phenomena, before and after B. C. 672 respectively: or to Julian dates attached to a given feria of the hebdomadal cycle, before and after the same point of time. It does not apply to merely nominal Julian dates. A *nominal* Julian date before B. C. 672 would continue the same after it also. It is certain that the *nominal* succession of equable dates continued the same both before and after B. C. 672: and the same thing is true of that of Julian. We could specify many terms of both kinds which nominally underwent no change in passing through B. C. 672: particularly the equable and Julian dates of all the cyclico-Julian calendars of antiquity. October 6, the original Isiac date, B. C. 1350, was still continuing the same in Ptolemy's time, A. D. 139.

Julian cycle of leap-year; it would have a double date: October 9 in every other year of the Julian cycle of leap-year, October 8 in the first year of that cycle itself. But in every year, except the first, of the Julian cycle of leap-year, its proper date would be October 9. Now B. C. 210 was one of those years; the fourth year of the Julian cycle of leap-year: in which the proper Julian date of this period would still be October 9—and not yet October 8. But if the date of the birth of Ptolemy Epiphanes had been Mesore 30 Nab. 539 B. C. 209, its Julian date must have been October 8; and therefore the Julian date of this period must have been October 8: and that would have involved us in many difficulties, and would have interfered with the coincidences which have just been pointed out.

Section IV.—*On the date of the erection of the golden calf in the wilderness at the Exodus.*

The course of the argument now requires that we should briefly consider the circumstances of the history of the golden calf in the wilderness; and whether those are calculated to throw any light on the Mneuis cycle of the Egyptians.

In the first place, it is to be observed that if the year of the Exodus, B. C. 1561–1560, in the ordinary course of things, was the first year of a cycle of 30 years, and of a cycle connected with the worship of the Mneuis; it would be rendered by that coincidence so much the more remarkable. Such years, under all circumstances, and in every kind of cycle, were the most solemn and important of their proper kind at least. Such years, in this particular case, more than any others of the cycle, would be considered sacred to the Mneuis; and no doubt among the Egyptians would be observed in some peculiar manner: in which the Israelites too, before the Exodus, and while they were scarcely to be distinguished from the Egyptians, and, as we may collect from Scripture itself[z], while they were infected even with their idolatry and superstition, might very well have been accustomed to sympathise with them.

In the next place, if the period of 30 years was always

[z] Ezekiel xx. 7, 8. 16. 18. 24: xxiii. 3. 8. 19. 21. 27.

connected with the Mneuis; if the Mneuis was the type of that cycle as the Apis was afterwards of the cycle so called from itself; then, in the first year of every such cycle, its proper representative in the person of the Mneuis must still have been a calf; a young animal of its kind at least, and not yet fully grown and matured: just as the Apis was at the first natales Apidis of its proper cycle, and just as it was when it appeared before Cambyses in B. C. 523. Now it is certain that the idol erected by the Israelites in the wilderness was a calf; a young animal of its kind at least [a]: and such an idol as would suit the representative of a cycle, like the Mneuis one, in its first year, when both were coming into existence together in order that both might continue in existence together, and that both at the proper time might come to an end together.

In the third place, the course of events being traced without interruption from the day of the delivery of the law to the day of the descent of Moses from the mount, on the morning when this calf had just been publicly set up, and when the people were even then engaged in paying idolatrous honours to it [b]; it is found that 47 is the utmost number of days which could have been taken up meanwhile; i. e. between the evening of Friday May 30, the day of the delivery of the law, and the morning of Wednesday July 16, when Moses came down from the mount for the first time, with the two first tables of stone in his hands [c].

It follows that the day on which the image of the calf (so well qualified, as we have seen, under all the circumstances of the case, to represent the Egyptian Mneuis at the beginning of its proper cycle) was actually set up, and, as if in that capacity and as the actual representative of the Mneuis, was welcomed and treated with divine honours, was July 16, B.C. 1560: from which coincidence we, for our own part, can draw no other inference but *this;* that July 16 was a stated date in the Mneuis cycle, a more solemn day in connection with the cycle of the Mneuis and the worship of the Mneuis,

[a] Exodus xxxii. 1–6: 8: 14: Deut. ix. 12: 16: 21. Ps. cvi. 19, 20. 1 Kings xii. 28. Nehem. ix. 18.

[b] Exodus xxiv. 1–4—xxxii. 15–18: 19. Deut. ix. 15–17.

[c] Exodus xxxii. 15–18: 19. Deut. ix. 15–19.

and particularly in the first year of the cycle, than any other in the year besides. And this would be explained at once, if July 16 was the stated date of the natales Mneuidis, especially in the first year of the cycle. There was a stated day in the Apis cycle for the natales Apidis: and we may take it for granted that there was one in the Mneuis cycle too, for the natales Mneuidis. And what could that be so probably as the day on which the Israelites, fresh from Egypt, and still unreclaimed from the idolatries and superstitions of Egypt, actually set up the image of the Mneuis, in the shape of a young bull, in the first year of its own cycle?

And here the analogy of the Apis cycle of after-times may come in to throw light on the most peculiar and characteristic circumstance of this older cycle of Mneuis. The natales Apidis, in the ritual sense of the phrase, meant a very different thing from the birthday of the Apis. It was always supposed to be born on the 10th of Athyr; but its birthday was kept on the 15th of Phamenoth: and this peculiar rule of the Apis cycle of later times it is far from improbable might have been borrowed from the peculiar rule of the Mneuis cycle of former times. So that, in this cycle too, it would be nothing extraordinary if the true birthday of the Mneuis should turn out to be one thing, and the day kept as his birthday, his mystical or his ritual birthday, his natales, properly so called, should prove to be another.

We have probably then ascertained that the Julian date of this cycle was October 9; and that the day, which appears to have been kept as the natales in the first year of the cycle, was July 16, in the second year of the Julian cycle of leap-year. What then is the distance in integral days and nights between these two Julian terms? 280 days. And this number is remarkable. It is the precise number of days, assumed, as we have seen, between the conception and the birth of the Apis[d]: and that too would be explained, if it had always been the stated interval in the cycle of the Mneuis, between its actual birthday, October 9, and its natales, properly so called, July 16. For the birth of the Mneuis, on this principle, would answer to its conception; if its natales, so called, 280 days later, answered to its birth.

[d] See Diss. xiii. ch. ii. sect. ix. vol. ii. 513.

These are singular and striking coincidences between the two cycles; coincidences which might have been the effect of design, or of an intentional accommodation of the Apis cycle of later date and of its most characteristic circumstances, to the Mneuis cycle and those of the Mneuis cycle of older date: but could scarcely have been produced by chance.

SECTION V.—*Inferences resulting from the preceding premises.*

The result of the above inquiry into the history of the Mneuis cycle, as far as it has yet proceeded, would appear to be this: That there is reason to believe a cycle of 30 years must have been instituted in Egypt in B. C. 1681: That it was a Julian period of its kind, and had a proper Julian date, Oct. 9 and Oct. 8: That it was connected with the Mneuis of the Egyptians: That the Mneuis was probably the type of this cycle, as the Apis afterwards was of the Apis cycle; and That the duration of this cycle was in all probability the measure of the life of the Mneuis, just as that of the Apis cycle was of the existence of the Apis.

We are told by Pliny that the Bull would live 30 years[e]: Vita maribus (tauris) tricenis: and this is no doubt a possible physical fact. It might have been observed in Egypt that the Bull did sometimes live to be 30 years old: so that this number of years might be assumed as the standing measure of the Mneuis cycle, even as limited to the life of one and the same Bull. And yet the standard of the Apis cycle, as measured by the life of a Bull too, was limited to 25 years: and though in this instance the standard could not be said to have been taken from the natural term of the life of the type of the cycle, but from the nature of the cycle itself, and from the relation of equable solar to equable lunar time; yet it might doubtless have been ascertained by long observation and experience in the case of the Mneuis cycle, that, though the life of the Bull was capable of being protracted to 30 years, it frequently came to an end four or five years earlier; and that, as the average or standard length of the existence of that animal, 25 years might much more safely be assumed than 30.

This period of 30 Julian years is the fourth part of the

[e] H. N. viii. 70. 529. Cf. Aristotle, De Animalibus, vi. 21.

cyclico-Julian period of 120 years. In one cyclico-Julian period of 120 years, there would be four of these periods of 30 years. The Egyptians had the Julian year among them from as far back as B. C. 1848; which was 167 years earlier than B. C. 1681. They could not therefore be ignorant of this cyclico-Julian period of 120 years: nor of the relation of four of these cycles of 30 years to one of 120. They had one Julian year attached to Nov. 18, B.C. 1848; and another attached to March 24, B. C. 1847: and it would not be any thing extraordinary if they were found to have introduced a third, B. C. 1681, attached to October 9. This period of 30 years, associated with the Mneuis, appears to have been Julian, and to have been attached to the same season of the year, and to the same day of the month, perpetually. Had it been found to be an equable period of 30 years, we might perhaps have accounted for the first idea of such a period, by supposing it intended to be the measure of 365 equable solar months of 30 days each; as it evidently would have been in that case: for 30 equable years contain the same number of days as 365 months of 30 days each. In this case, it might have been considered an equable year, consisting of months instead of days; and therefore as a year of that kind, peculiarly sacred to the sun. Nor is it impossible that the first idea of the period itself might have been conceived in that way; though it does not appear that the period was ever actually reckoned except in Julian years.

In this year, B. C. 1681, the mean vernal equinox for the meridian of Jerusalem, according to our tables, is seen to have fallen out April 6, 17h. 55 m. 19s. 12th.; from which it may be calculated that the true autumnal equinox for the meridian of Heliopolis must have fallen out almost exactly October 7 at 12 hours *. And this approaches so near to

			h.	m.	s.
* Mean V. E. at Jerusalem, B. C. 1681 ..		April 6	17	55	19·2
			—	15	44
	At Heliopolis, ...	April 6	17	39	35·2
	Two quarters, ...	+ 182	14	54	25·2
Mean A. E.		Oct. 6	8	34	0·4
	Equation of the centre ..	+ 1	4	7	37·3
True A. E.		Oct. 7	12	41	37·7

the date of Thoth 1 the same year, according to the primitive rule, and to that of the cycle of 30 years now instituted, (if it was instituted at this time,) that we need no other argument but this coincidence to satisfy us that it must have been purposely attached to the autumnal equinox. The Egyptians had a Julian calendar in their calendar of Mazzaroth, attached to the opposite season of the year; and even to the vernal equinox through that and the Phœnix period: but they had none as yet attached to the autumnal equinox; and this cycle of 30 years might be introduced and attached to the autumnal equinox in order to supply that desideratum. It should be remembered that the date of the autumnal equinox itself, B. C. 1848, was October 9[e]: and the same B. C. 1847 also: and that a Julian calendar attached to the autumnal equinox at *that* time must necessarily have borne date October 9. It is very observable also, that this fixed Julian term of October 9, in connection with the Mneuis cycle so introduced in B. C. 1681, and the Julian Isiac term, attached to October 6, B. C. 1350, approached nearly to a coincidence; yet no day in the Isia but the fourth, reckoned from this term, could ever fall on October 9; and in the first instance, (that of the Isia as originally instituted,) the fourth day, Athyr 20, actually did fall on October 9, B. C. 1350, in the first year too of one of these periods of 30 years. The fourth day of the Isia might very properly coincide with such a term as this; but not any day before the fourth, the character of each of which was so different from that of the fourth.

It is far from improbable that the institution of the Mneuis cycle, in B. C. 1681, and the choice of the Bull as the type and representative of such a cycle, was the beginning of animal worship in Egypt. There is no proof in Scripture of the existence of animal worship in that country at the time of the descent into Egypt. We read indeed, even then, of the Hebrews being an abomination to the Egyptians[f]: but merely on account of their employment as herdsmen and shepherds. This year, B. C. 1681, was twenty-five years later than the death of Joseph, which we reckon to have happened B. C. 1706; and forty-one years earlier than

e See vol. iii. 240.

f Gen. xliii. 32; xlvi. 34.

the birth of Moses, B. C. 1640: so that the institution of the cycle, and the deification of the type of the cycle, were undoubtedly the work of a generation older than Moses, and yet which "knew not Joseph;" and could not have been contemporary with the descent. There cannot be any question that this Bull was sacred to the sun from the first. Its regular hieroglyphical symbol is a globe, like that of Ra, or Re, the sun also[g]; and a feather on its head: taken as we apprehend from the hawk, which together with the globe constituted the symbol of the sun.

With regard to the day, which appears to have been kept as the natale Mneuidis, or to have been the first of the days observed in that capacity, if there were more than one, July 16; its designation for that purpose in our opinion is explained by the fact that it was reckoned the stated date of the commencement of the water season in Egypt; a coincidence which will be better understood when we come to consider the Julian calendars of the Egyptians; as we hope to do in our next Dissertation. There is frequent mention on the monuments of a celebrity to which great importance appears to have been attached; called the Panegyries of the Waters: and from the intimations discoverable on them of the nature and particulars of this solemnity, it may be collected that it lasted several days. We are altogether of opinion that these were the natales Mneuidis properly so called, attached to this Julian term of July 16: and fixed to that day and to that season of the year in order to commemorate the beginning of the inundation. These panegyries of the waters had once an historical existence; but we discover no traces of them in later times, except on the monuments: and, in our opinion, they had no existence in later times, except in these allusions to them on the monuments: and though they once existed, and were once associated with the worship of the Mneuis, it was only before the introduction of the worship of the Apis. After the introduction of the worship of the Apis, this annual festivity in honour of the Mneuis, attached to the same season of the year and to the same day, appears to have been merged in the natales Apidis; celebrated annually also, but from the nature of the calendar

[g] Wilkinson, Second series, ii. xiv. 195, 197; cf. 119. i. xiii. 295. 403.

with which they were connected, necessarily liable to circulate round the year. And as we find it intimated on the Rosetta stone that Phthas, the Egyptian Vulcan, another tutelary genius of Memphis, and associated with the Apis in that capacity, was recognised as the lord of these periods of 30 years, as much as the young Ptolemy, and of course long before him; we consider it extremely probable that this stated panegyry of the waters, in honour of the Mneuis, was first superseded *de facto* by the natales Apidis when the worship of Phthas also was first associated with that of the Apis, whensoever that was done; which we think would most probably be the case at the beginning of some one of these periods of 30 years.

As the natales Apidis were celebrated for seven days, it is not unlikely that these panegyries of the waters, the natales Mneuidis, were originally celebrated for seven days too: i. e. from July 16 to July 22 inclusive. These terms are remarkable; as comprehending between them the Julian dates of the heliacal rising of Sirius, for every latitude in Egypt, beginning with the lowest, that of Syene or Elephantine, where it took place first and on July 16, and ending with that of Memphis, Heliopolis, and the sea-coast, where it took place last, on July 21 or 22[h]. And this is strongly confirmed by the Scriptural account of the first of the plagues of Egypt; the exclusive subject of which was the Nile, and the other waters of Egypt. This plague lasted seven days[i]: and that is explained, if the stated duration of these panegyrics of the waters, the natales Mneuidis, was seven days too; beginning July 16 and ending July 22. And in that case the date of this first plague itself in the year of the Exodus must have been July 15: and consequently the commencement of the series of visitations of that kind in this memorable year is to be dated from July 15 B. C. 1561, which that year fell on the feria secunda, or Monday[j].

h Biot, Recherches sur plusieurs points de l'Astronomie Égyptienne, notes, 307, 308. See supra, Diss. xiv. ch. ii. sect. v. vol. iii. 53, 54.

i Exodus vii. 25.

j See supra, Diss. x. ch. vii. sect. ii. vol. ii. 227. We say July 15 in the year of the Exodus, B. C. 1561, the first year of the Julian cycle of leap-year. For if the Mneuis cycle at this time still began in the first year of the Julian cycle of leap-year, its stated Julian date in every year of the cycle alike would be October 9: but 280 days reckoned from October 9 to the beginning of the Panegyry of the waters in the last year of the Mneuis cycle, B. C.

SECTION VI.—*On the other sacred Bulls in Egypt.*

We shall conclude this account of the Mneuis, and of the Mneuis cycle, with a brief mention of some other sacred Bulls of the Egyptians, besides this and the Apis.

Macrobius observes[k]: Taurum vero ad solem referri multiplici ratione Ægyptius cultus ostendit: vel quia apud Heliopolim taurum soli consecratum quem Neton appellant maxime colunt: vel quia bos Apis in civitate Memphi solis instar excipitur: vel quia in oppido Hermunthi magnifico Apollinis templo consecratum soli colunt taurum Pacin cognominantes, insignem miraculis convenientibus naturæ solis. nam et per singulas horas mutare colores affirmatur, et hirsutus setis dicitur in adversum nascentibus, contra naturam omnium animalium: unde habetur veluti imago solis in diversam mundi partem nitentis.

We recognise in the latter part of this description Porphyry's account of the Mneuis, quoted supra[l]; so that this Bull Pacis, as Macrobius calls it, must be of later date than the Mneuis: and it was probably intended to be another Mneuis in its way. Its existence at Hermunthis is attested by Strabo: Μετὰ δὲ Θήβας Ἑρμωνθὶς πόλις, ἐν ᾗ ὅ τε Ἀπόλλων τιμᾶται, καὶ ὁ Ζεύς· τρέφεται δὲ καὶ ἐνταῦθα βοῦς[m].

It is singular that Macrobius should call the Bull which he first mentions, and which is evidently meant of the Mneuis, Neton, and not Mneuis: and equally so that he should mention Neton again[n], as the name of the image of Mars (yet as wearing the insignia of the sun) among the Accitani in Spain. Another sacred Bull is mentioned by Ælian[o], under the name of Onuphis; which was worshipped in some city, the name of which he declines to specify. Onuphis itself was the name both of a city and of a nome in Egypt[p].

1562–1561, would necessarily fall on July 15, not on July 16, because B. C. 1561 was leap-year. The year after however, B.C. 1560, 280 days reckoned from October 9 would fall on July 16, the very day which the Israelites appear to have kept as the natale or birth-day of their calf. It must be admitted that this is a striking coincidence. It would not be possible to fix the descent of Moses from the mount, on the day when this act of idolatry was first consummated, to an earlier term than July 16.

[k] Saturnalia, i. xxi. 315.

[l] Page 150.

[m] xvii. 4. Cf. Steph. Byz. Ἑρμωνθίς: who adds, ἔστι δὲ ἐκεῖ καὶ Ἴσιδος ἱερόν.

[n] i. 19. 304.

[o] De Natura Anim. xii. 11.

[p] Steph. Byz. 615, Ὄνουφις. Herodotus, ii. 166.

Mon. Le Tronne observes[q] that the Bull called Mneuis was kept at Memphis as well as at Heliopolis: and that its death was lamented there with the same ceremonies as that of the Apis. In hieroglyphical characters, the name of this Bull is read Mne[r]: of which the Greeks made *Μνεῦις* and *Μνεύης*. We should consider the Egyptian Menes itself only another form of Mne. The most remarkable circumstance however is that both Plutarch and Porphyry positively assert the Mneuis, the Bull of Heliopolis, to have been totally black: yet a Bull occurs repeatedly on the monuments, especially in connection with Thebes, which is always white[s]. Of this distinction we may have something to say hereafter.

q Recueil, i. part ii. 296. xxv.

r Wilkinson, Sec. series, ii. xiv. 197. Birch, Egyptian Antiquities, part i. 52, 53.

s Champollion, Monum. de l'Égypte, tome ii. cl. tome iii. ccxii. ccxiv. Birch, Egyptian Antiquities, part i. 52. 53. Wilkinson, Second series, ii. xiv. 196.

DISSERTATION XVII.

On the Julian Calendars of the Egyptians.

CHAPTER I.

Section I.—*Many Julian Calendars, after a time, coexistent in Egypt.*

It is a corollary of the conclusions established in the preceding Dissertations, that the principle of the Julian reckoning of annual and noctidiurnal time must have been perfectly well understood by the Egyptians from as far back as the epoch of their Phœnix period, B. C. 1848—1847. And that being the case, there is no reason why the principle itself might not be reduced to practice and applied in various instances from that time forward too.

Our researches have brought different Julian terms to light, which were competent to serve as the epochs of a perpetual reckoning of annual time on the Julian principle; and which appear to have actually served that purpose. We have discovered one such term in the Julian date of the calendar of Mazzaroth, March 24; another in that of the Thirty years' period or Mneuis calendar, October 9; and a third in the original epoch of the Isia, October 6: and we have little doubt that there were others besides these among the Egyptians serving a similar purpose in similar calendars, some of which our future inquiries may possibly succeed in detecting.

Nor is there any reason why a Julian reckoning of this description should be supposed to have interfered with the continued use of the primitive reckoning of annual time, in the shape of the equable solar year. It was manifestly possible that the civil and national calendar, both public and private, might always remain the same; and yet both the principle and the practice of any other form of the reckoning of annual time be known to the priests of Egypt, and be applied for purposes of their own in a variety of ways. There is no incompatibility between a fixed Julian year and a

moveable or equable year, at any time. It is certain that the equable year of the Egyptians after a time circulated round one fixed Julian term, in the epoch of the Sothiacal period: and if it could do so round one such Julian term, it might do so round any number of them. We have little doubt indeed that, when the discovery of the principle of the Julian year had once been made, Cyclical and Julian annual time, after a time, were going on simultaneously and concurrently in Egypt in a variety of instances, and in perfect harmony one with the other; and in particular without disturbing the prescriptive right of the equable year to the sole and exclusive possession of the national calendar, and to the sole and exclusive regulation of the national solemnities and observances. While public and private business of every kind continued to be still subject to the equable calendar; in the temples and in the observatories, in the schools and in the colleges, of Egypt, for the purposes of science, for the sake of history and chronology, and even of the more mysterious and esoteric doctrines of their own religion, Julian time was observed and noted by the priests with the utmost precision and exactness.

Section II.—*On the principal types of the Julian year of the Egyptians, the Phœnix type, and the Sothiacal type.*

But though it might be the case, and to a certain extent it must have been the case, that many forms of the Julian year, after a time, existed simultaneously in Egypt; and though the nature of the Julian year itself was such that, when its principle had once been discovered, no limit could possibly be assigned to its application in practice; we are entirely of opinion that the name or designation of the Julian year of the Egyptians is properly to be restricted to two types or varieties of the reckoning of annual time, in conformity to the Julian rule, as the most important and the most characteristic which were ever in use among them: one of which, for distinction's sake, we shall beg leave to call the Phœnix type of the Julian calendar of the Egyptians, and the other the Sothiacal. The individual difference of these two types, and yet the relation existing between them, and the connection of one with the other, we shall proceed to explain and to illustrate as briefly, but as intelligibly, as we can.

i. As we have already observed, though the principle of the Julian reckoning of annual time had been totally unknown to the Egyptians down to the date of their first Phœnix period, it must have been discovered by that time; and from that time forward it must have been well understood by them, and perfectly familiar to them. The proper date of that first period was A. M. 2158, B. C. 1847; both which corresponded to æra cyclica 2159. But the Phœnix period was reckoned from the mean vernal equinox, April 7 or 8 A. M. 2158 B. C. 1847: the corresponding equable year was falling in the opposite quarter of the natural year, A. M. 2157 B. C. 1848: for the first of the equable Thoth, æra cyclica 2159, as our tables shew, entered November 17 at 18 hours, according to the primitive rule, November 18 at midnight, according to the Julian, A. M. 2157 B. C. 1848. If a Julian calendar is supposed to have come into being at this time, attached to the first of the equable Thoth, its epoch, under such circumstances, must have been November 17 at 18 hours, according to the primitive rule, November 18 at midnight, according to the Julian, B. C. 1848. Let us call such a calendar, supposed to have taken its rise simultaneously with the Phœnix period, the Phœnix type of the Julian calendar of the Egyptians. It must have stood, in the first instance, as follows:

Phœnix type of the Julian Egyptian calendar.
Julian calendar, Type i.

Thoth 1. Æra cyc. 2159.
Nov. 18. A. M. 2157. B. C. 1848.

Months.	Midnight.	B. C.	Months.	Midnight.	B. C.
i. Thoth	Nov. 18	1848.	vii. Phamenoth	May 17	1847.
ii. Phaophi	Dec. 18	—	viii. Pharmuthi	June 16	—
iii. Athyr	Jan. 17	1847.	ix. Pachon	July 16	—
iv. Chœac	Feb. 16	—	x. Paüni	Aug. 15	—
v. Tybi	March 18	—	xi. Epiphi	Sept. 14	—
vi. Mecheir	April 17	—	xii. Mesore	Oct. 14	—

xiii. Epagomenæ, Nov. 13.

This calendar however, having thus taken its rise in the *second* year of the proper Julian cycle of leap year; in the *third* year of its own cycle, (the *leap*-year in the Julian,) these dates would all be found to have dropt one day; and not to have returned to the same form, under which they are here exhibited, except at the end of the fourth year of their proper cycle, in the second year of the Julian cycle. It must

be considered therefore as attached perpetually to a double date: November 18 in the second, and third, and fourth years of the Julian cycle of leap-year, November 17 in the first.

ii. There would be still less reason to doubt that, though neither the theory nor the application of the Julian principle of the reckoning of annual time had been known to the Egyptians down to the epoch of their Sothiacal period, yet both must have been familiar to them from that time forward. The equable date of this period was Thoth 1, æra cyclica 2657; the Julian, July 22, A. M. 2655 B. C. 1350. If a Julian calendar was introduced at this time, attached to the first of Thoth, æra cyclica 2657, its Julian date must have been July 22, A. M. 2655 B. C. 1350; but this being the fourth year of the proper Julian cycle of leap-year, though the first of its own, it must of necessity be found to have dropt to July 21, in the second year of its own cycle, the first of the Julian. And therefore it must have had from the first a double Julian date; July 22, in the first year of its own cycle, the fourth year of the Julian cycle, July 21, in the second and third and fourth years of its own cycle, and the first and second and third of the corresponding Julian. Let us call this the Sothiacal type of the Julian calendar of the Egyptians. If we wish to compare this with the preceding, which we have called the Phœnix type, and which took its rise in the second year of the Julian cycle of leap-year, and consequently in the third year of the proper cycle of this type; it is proper to institute the comparison between them in the same year of the Julian cycle of leap-year relatively to each: and therefore not in æra cyc. 2657, A. M. 2655, B. C. 1350, but in æra cyc. 2659, A. M. 2657, B. C. 1348.

Sothiacal type of the Julian Egyptian calendar.
Julian calendar, Type ii.

Thoth 1. Æra cyclica 2659.
July 21. A. M. 2657. B. C. 1348.

Months.	Midnight.		B. C.	Months.	Midnight,		B. C.
i. Thoth	July	21	1348.	vii. Phamenoth	Jan.	17	1347.
ii. Phaophi	Aug.	20	—	viii. Pharmuthi	Feb.	16	—
iii. Athyr	Sept.	19	—	ix. Pachon	March	18	—
iv. Chœac	Oct.	19	—	x. Paüni	April	17	—
v. Tybi	Nov.	18	—	xi. Epiphi	May	17	—
vi. Mecheir	Dec.	18	—	xii. Mesore.	June	16	—

xiii. Epagomenæ, July 16.

SECTION III.—*Remarks on the above types, and confirmation of each by facts on record.*

i. The first remark which may be made on these two types, one being considered as real as the other, is that there is no difference between them but one which must be regarded as purely accidental and indifferent; viz. that one begins Nov. 18, the other July 21; and that the seat of the epagomenæ in the one is Nov. 13, in the other is July 16. But if the epagomenæ in type i were to be shifted from the end of the xiith month to the end of the viiith; then, from the ixth month of this type i, there would be no difference between it and type ii, except in the names and nominal order of the months; which must be considered only an accidental distinction.

ii. The comparison of these types together shews that, from the first of Thoth in type ii to the first of Thoth in type i, the interval is just 120 days; that being the number of days from July 21 to November 18: and, in like manner that the interval from Thoth 1 in type i to Epagomene 1 in type ii is 240 days, or 120×2; that being the number of days from November 18 to July 16 in the common years of the Julian cycle of leap-year. And on this principle, the entire interval in type ii from Thoth 1 to Epagomene 1 would be found to distribute itself into three equal periods of 120 days; the first from July 21 to Nov. 18, the other two from Nov. 18 to July 16.

Now this distribution of the year into three equal periods of 120 days, or four months of 30 days each, is known to have been made by the Egyptians; and according to their own account, it was of as long standing among them as the supposed reign of their god-kings: Τούτους δὲ τοὺς θεοὺς, observes Diodorus [t], *ὑφίστανται τὸν σύμπαντα κόσμον διοικεῖν τρέφοντάς τε καὶ αὔξοντας πάντα τριμέρεσιν ὥραις . . . . τῇ τε ἐαρινῇ καὶ θερινῇ καὶ χειμερινῇ*—Κατ' *ἐκείνους γὰρ τοὺς χρόνους τὸν ἐνιαυτὸν ἀπαρτίζεσθαι τέτταρσι μησὶ, τοῖς γινομένοις κατὰ τὰς ἑκάστων τῶν χρόνων ὥρας, οἷον ἔαρος θέρους χειμῶνος* [u]. But the above

t i. ii.

u i. 26. Cf. i. 12: of Minerva, as called Tritogeneia: and i. 16. of the Lyre as the invention of Mercury or Hermes, and furnished at first with three strings only, in imitation of these

comparison we think is competent to prove that it could not in reality have been older than the Sothiacal type of their Julian calendar; and that it must have been founded on the relation of this second type to the more ancient one which we have called their Phœnix type.

iii. This peculiar division of the year into three seasons of four months each is attested by the monuments and sculptures [w]. These seasons were called the season of the water plants, the season of ploughing, and the season of the waters, respectively. The first comprehended the first four months of type ii, Thoth, Phaophi, Athyr, Chœac: the second, the four next; Tybi, Mecheir, Phamenoth, Pharmuthi: the third, the four last, Pachon, Paüni, Epiphi, Mesore. Now this division could have been properly applicable only to the first four months of the second of the above types; as may most clearly be collected from the distinction which it makes between the season of the water-plants and the season of the waters. The season of the water-plants must have been later than that of the waters, if this denoted the beginning of the inundation; and on the first of Thoth, in this second type, July 21, the inundation would always have made some progress, and the water-plants might already have begun to appear. And as the inundation could not be said to be over before the beginning of November, it is evident that on this principle the season of the water-plants might be assumed to last four months: viz. from Thoth 1 to Tybi 1, from July 21 to November 18.

But if the season of the water-plants was thus to extend from July 21 to November 18, that is, almost from the beginning to the end of the inundation; what was the season of the waters, which properly means the season of the inundation? and where would that begin and end in contradistinction to the season of the water-plants? According to type ii, on March 18 Pachon 1; lasting till July 21 Thoth 1. On what principle however could the inundation be supposed to begin in March, and to end in July? In like manner, the ploughing season, or sowing season, or gardening season,

three seasons. Cf. also Horapollo, i. ii. of the division of the year into three periods of 120 days each, with respect to the natural history of the vulture.

[w] Wilkinson, First series, ii. vi. 298. Second, i. xi. 14.

according to the same division. could not have begun earlier than Tybi i November 18; and yet we have produced proofs that in strictness it was reckoned to begin at the autumnal equinox; and certainly that it must have begun and been going on long before November 18. It is manifest therefore that such a division of the calendar among the three seasons in question, as this, could not have been adapted to the real state of the case, or to the relation of the calendar itself to each of those seasons respectively, in the second type of the Julian calendar of the Egyptians which we have called the Sothiacal; except in one of these instances only, that of the second division, the season of the water-plants. The first four months of this type might answer to the description of the season of the water-plants; but the next four would not answer to that of the ploughing or gardening season, the season of vegetation in general: and still less would the last four correspond to that of the season of the waters.

It appears however that the Egyptians had another division of their calendar among three seasons of four months each, in which the months themselves were distributed nominally in the same order as in the preceding, the first four being assigned to the first, the next to the second, the four last to the third; but the seasons, excepting the third, were not called by the same names. The first of this other division of seasons was called the season of vegetation; the second was called the season of housing; the third the season of the waters[x]: the first comprehending Thoth, Phaophi, Athyr, Chœac; the second Tybi, Mecheir, Phamenoth, Pharmuthi; the third Pachon, Paüni, Epiphi, Mesore.

Now we have only to compare this division with the Phœnix type of the Julian calendar of the Egyptians, to

[x] Nolan, Egyptian Chronology, Part iv. sect. iii. 418. cf. Part iii. sect. iv. 365. See also "Die Chronologie der Ægypter" of the cheval. Lepsius, "Einleitung," p. 134. where not only the division of the months into these three seasons of four months each, but the hieroglyphical symbols of each division, will be seen exhibited. It is observable that the same symbol serves for each of the months in the same division. In the first division, that of the waters, it is nothing but the usual hieroglyphical symbol of water; in the next, the season of vegetation, it is the symbol of a garden, of growing plants of some kind at least; in the third, the season of housing, the symbol is the ground plan of an house, with the phonetic complement of a *mouth;* plainly intimating that this was the season in which the productions of the ground, most necessary and most conducive to the support of life, were gathered and laid up in store.

perceive that it would be the most natural imaginable for such a type as that. The season of vegetation, in that type, would begin Nov. 18; the season of housing or reaping, March 18; and the season of the waters, July 16. The former for the epoch of B.C. 1847, when we suppose this type to have come into existence, would be 40 days later than the autumnal equinox, when vegetation for the climate of Egypt must necessarily be far advanced; the second, would be only 20 days earlier than the vernal equinox, when various productions of the ground would already be ripe, and in a fit state to be gathered and secured; the last would be six days at least later than the summer solstice, by which time the inundation must already have begun, and the season of the waters, strictly so called, must actually have set in.

And it further appears from the discoveries made in the language of hieroglyphics that, as these seasons of the Egyptian calendar, and the months of which they consist, known by their usual names, and in their usual order, have proper hieroglyphical symbols; so these are such in each instance as must have been taken from certain relations of those seasons and of those months themselves to the natural year, which could have held good only at a particular time, and could never have characterised the months of a cyclical or revolving calendar, except at such a time as that[y]. And these too are such as to suit altogether to the positions of those months in the natural year at the epoch of the Phœnix type of the Julian Egyptian calendar.

For example, supposing the first month of the equable calendar, which always bore the name of Thoth, to have been coinciding with seed-time, when such symbols were first applied to the months or may be supposed to have been: what season was so likely to be characterised by a symbol denoting vegetation, as that which began with Thoth? Could it admit of a question in the case of the climate of Egypt, in which seed would vegetate in seven or eight days' time at the utmost; that 40 days after the commencement of the process of committing it to the ground on a large scale vegetation would be going on every where, sensibly and rapidly, throughout the land of Egypt? Accordingly this season is that which

[y] See the note, from the Einleitung of the chevalier Lepsius, just quoted.

is characterised by the symbol of vegetation. Nor can any one doubt that B. C. 1848, when the first of Thoth was falling Nov. 18, 40 days later than the autumnal equinox, and the first of Phaophi, Dec. 18, 70 days later, such a natural criterion as the symbol of vegetation would be eminently proper for these two months, and for the two which follow them also. It cannot be doubted that for the climate of Egypt, at any season of the world's existence, 70 days after the autumnal equinox, vegetation on a large scale would be almost half-way advanced towards its maturity.

In like manner, the season of vegetation on a large scale beginning in Thoth, and vegetation being already considerably advanced in Phaophi; what season was so likely to coincide with the beginning of ingathering, and therefore to carry along with it the symbol of housing, as that which began with Tybi, the fifth from Thoth; 160 days from the autumnal equinox, 120 from the beginning of vegetation, dated on the first of Thoth? particularly if, as the ancients declare and as modern experience attests and confirms [z], both barley and wheat, and the other grains, attain to their maturity in Egypt four or five months after they are sown; and the harvest of each kind is over soon after the vernal equinox. Now this second season was characterised by the symbol of *housing*: so that, when that symbol was assigned to it, its proper site in the natural year must have been supposed to be at or about the harvest season for the climate of Egypt; which is, in other words, at or about the vernal equinox. Such was the site of the fifth and the sixth month in the Phœnix type of the Julian Egyptian calendar. The former was dated March 18, the latter April 17: the former only twenty days earlier, the latter only ten days later, than the vernal equinox itself, B. C. 1847, April 7.

From these therefore and similar considerations, it may justly be argued that, of the two distributions of the seasons of the natural year among the months of the civil calendar, the first would be altogether unsuitable to the Sothiacal type of the Julian calendar of the Egyptians, in any of those divisions but the first, the season of water-plants: the second

[z] See supra, Diss. x. ch. vii. sect. ii. vol. ii. 222, sq.

would be altogether suitable to the Phœnix type in every instance alike: and from this distinction we must infer that this latter is the proper division of the natural year among the months of the civil, which the Egyptians must some time have made or must be supposed to have made; not the second. And the type of the civil year, to which it was properly accommodated, must have been their first and oldest type of the Julian year, such as we mean by that which we have called the Phœnix one; and not their second, and much later one, which we term the Sothiacal *.

The general result then of our reasonings on this point is That, whatsoever other types of the Julian year the Egyptians might have among them, the principal ones were these two; to which we have given these names respectively. The difference between these themselves, as we have observed,

* A singular *μῦθος* or fable appears to have been related in one of the lost poems of Pindar, of which some idea may be formed from the following allusion to it in the Etymologicum Magnum, Πλειάς: Ἀπὸ τῆς Πληϊόνης, θυγατρὸς μὲν Ὠκεανοῦ γυναικὸς δὲ Ἄτλαντος. λέγει δὲ Πίνδαρος περὶ τοῦ καταστερισμοῦ αὐτῶν ὅτι τῆς Πληϊόνης πορευομένης μετὰ τῶν θυγατέρων κατὰ τὴν Βοιωτίαν συναντῆσαι αὐτῇ Ὠρίωνα. εἶτα ἐρασθεὶς ὥρμησε πρὸς τὸ ἁρπάσαι. τὴν δὲ φεύγουσαν μετὰ τῆς θυγατρὸς Ὠρίων ἐδίωκε. γενέσθαι δὲ αὐτῶν τὸν δρόμον πέντε ἔτη ἀδιάλειπτον. τὸν δὲ Δία διὰ τὴν κακοπάθειαν αὐτῶν οἱονεὶ μνήματα κατηστερίσθαι (lege καταστερίσαι) τὰς Πλειάδας φευγούσας τὸν Ὠρίωνα, ὅς ἐστιν ἐνιαυτός. Cf. the Scholia ad Pindar. Nemea, ii. 16: and Tzetzes, ad Hesiod. Opp. et Dies, 382: and 612.

The first authors of this fable, according to the Scholia on Homer, Il. Σ'. 486, were the cyclical poets; but in our opinion it was founded ultimately on this Julian year of the Egyptians, in which the stated date of the Epagomenæ was Nov. 13, and that of the first month was Nov. 18. Orion and the Pleiads were observed to set always at the same season of the year, and that season November; and within a short distance of time of each other. In Eudoxus' calendar (apud Geminum) the Pleiads set cosmically Nov. 14; and Orion begins to set the same day. According to him too Scorpio begins to rise the day before, Nov. 13: and it was another fable of antiquity relating to Orion, that he came by his death through the sting of a scorpion. Hence the Scholia on Homer, (ad Iliad. Σ. 486.) Διὸ τοῦ σκορπίου ἀνατέλλοντος Ὠρίων δύνει. ἡ ἱστορία παρὰ Εὐφορίωνι. Cf. ad Odyss. E. 121.

The supposed length of the flight and of the pursuit, five years, (i. e. four complete,) is significant; for that is the cycle of the Julian leap-year, in which the same astronomical phenomena return to the same Julian dates. The date of the invention of these fables is probably that of the admission of these constellations into the sphere.

was simply in accidentals. Upon the distinction of these two types however appears to have been founded the peculiar Egyptian division of the year into three seasons of 120 days, or four months each. It has commonly been remarked of this division, that it is one which nature itself might be supposed to have made for the climate of Egypt, in which there is no winter; and where the interposition of the inundation is a phenomenon of stated and regular occurrence, at the same season of the natural year, and for the same length of time, a third part of the natural year itself; leaving only eight months out of the twelve for the labours of agriculture, for the sowing of seeds and the securing of crops, or for the general purposes of social life. Nor do we dispute the truth of this observation in point of fact. Yet we think nevertheless that we have pointed out the true first cause of the peculiar division in question, in the relation of the Sothiacal type of the Julian calendar of after-time to the Phœnix one of earlier date; and the reason, why four months or 120 days were assigned to each of these sections of the year, to have been the fact of the distance of the *first* day of the Sothiacal type from the *first* of the Phœnix type; which happened to be four such months, or 120 days, exactly. And after all, this peculiar division of the year, into three equal parts of four months each, was not so much one of the natural year as of the civil; not so much of the seasons as of the calendar: and the civil calendar, not the natural year, is to be considered as the subject first and properly concerned in it.

We see too that the season of the waters in the Phœnix type, which was considerably older than the Mneuis type, having been thus from the first determined to July 16, the first of the ninth month in that type; this would be reason sufficient to determine the Panegyry of the waters to July 16 from the first, and therefore the natales Mneuidis also, as the same with that; which appear to have been actually attached to July 16. It is observable also that the true date of the autumnal equinox, B. C. 1847, was October 9, almost exactly at noon, for the meridian of Heliopolis; and consequently that the epoch of the Mneuis cycle, carried back from B. C. 1681 to B. C. 1847, would fall critically on the autumnal equinox: and the first 280 days too, reckoned from

October 9, B. C. 1847 or 1848, would fall on July 16. These considerations might have much to do with the determination of the actual epoch of that cycle, October 9, B. C. 1681.

It is evident also, from what we have shewn on that point, that the hieroglyphical symbols of the seasons in the Egyptian calendar must have been first and properly intended for the months of this Phœnix type, as distributed among such seasons. Nor would that prove that those symbols were as old as this type; only that, whensoever those symbols were devised, they were adapted to the seasons and months in this type; they were intended to be true of the months in that relation to the natural year in which they stood to it in this type: and they would actually be true of the civil or calendar months in that relation to the natural, but in no other.

As to the names and order of the months in the two types, they were the same in each; and yet there was 120 days difference between any one month in either, and the month so called in the other. The best explanation of this fact, in our opinion, is that these names were first given to the months in the *second* of these types; and were afterwards transferred to those in the first: so that, though the symbols were most proper for the months of the first type, the names belonged most properly to those of the second. This distinction at first sight may appear improbable, but in reality there is no difficulty in it; if the symbols were derived from natural peculiarities, adapted only to certain seasons of the natural year, but the names from a totally different kind of relations, which had nothing whatsoever to do with the seasons of the natural year, or with the sites of the months therein.

And should any one think of asking for a reason why two different types of the Julian year, so like each other in all essential respects, should have been adopted by the Egyptians; this is perhaps to be found first in the rise of the Sothiacal period, and in the introduction of the worship of Osiris and Isis, and in the institution of the Isia, at a particular time, which we have determined to B. C. 1350; and when the first of the equable Thoth was falling on the Julian date of this second type, July 22. The Sothiacal period must be connected with a Julian calendar; the epoch of which must be its own epoch perpetually. Whether it was accident,

or whether it was design, which determined the Sothiacal type to July 22, (and in our opinion it was design,) it must constitute a type of its own from that time forward; and yet it must stand in that peculiar relation to the Phœnix type which we have pointed out. Secondly, in the fact that probably by B. C. 1350 it had been discovered that the cycle of leap-year in the Phœnix type was not the natural period of that year; and the Egyptians might wish to substitute for it a cycle like that of the Sothiacal type, which was much better qualified to answer to that description. If we go back with Julian annual time, according to its peculiar rule, to the beginning of things; we find the proper epoch of the first strictly Julian cycle, in March 1 B. C. 4005; and the proper Sothiacal epoch adapted to this in July 22, B. C. 4006. It is certain at least that the Sothiacal cycle of leap-year, B. C. 1350, was such as would have been regularly deducible from July 22, B. C. 4006. This cycle was taken up and continued by the Alexandrine, B. C. 26. It is retained in the Coptic, at the present day. We probably owe to it, as we shewed elsewhere [b], the Julian cycle of leap-year itself. Nor should we think it unlikely that, when the Egyptians corrected the cycle of their Phœnix type, they corrected that of their calendar of Mazzaroth also.

Section IV.—*On the names of the months in the Egyptian calendar. In particular on those of Thoth and Mesore.*

We have already declared it to be our opinion that the months of the primitive Egyptian calendar received names, different from those of number and order merely, at the epoch of the Sothiacal period; and this is strongly confirmed by one or two of those names themselves; particularly by that of the first month, Thoth, and by that of the third, Athyr; the former taken from the name of one of the Egyptian divinities who could not have been older than Osiris and Isis; the latter the name of the month sacred to the Isia from the first, and so denominated from its relation to it.

But with regard to the meaning of these different names, there is no reason to doubt that they were all significant of something or other; though no one, so far as we know, has

[b] Diss. ix. ch. ii. sect. ii. vol. ii. 43.

been able satisfactorily to explain what that was. So little in fact appears to us to be known on this subject, that we think it better to decline entering on the consideration of these names, than to propose nothing concerning them but surmises and conjectures. There is only one, about which we could venture to pronounce a confident opinion; i. e. the first on the list, the month which we have uniformly called Thoth; viz. that this month must have been purposely so called after a person, divine or human, among the Egyptians, the same in general as that which the Greeks supposed to be meant by their Hermes, and the Latins by their Mercurius; and to which the Egyptians attributed the invention of language, of letters, of numbers, of geometry, of astronomy; and the first introduction of laws, and rules of life: just as the Greeks and Romans did to their Hermes and their Mercury. The first month in the Egyptian calendar, in our opinion, was so called after this Thoth: and this is a point which we shall proceed to illustrate somewhat particularly.

SECTION V.—*On the Thoth of the Egyptians, the Hermes of the Greeks, and the Mercurius of the Romans.*

i. Ἤκουσα τοίνυν περὶ Ναύκρατιν τῆς Αἰγύπτου γενέσθαι τῶν ἐκεῖ παλαιῶν τινα θεῶν, οὗ καὶ τὸ ὄρνεον τὸ ἱερὸν ὃ δὴ καλοῦσιν Ἶβιν. αὐτῷ δὲ ὄνομα τῷ δαίμονι εἶναι Θεύθ· τοῦτον δὲ πρῶτον ἀριθμόν τε καὶ λογισμὸν εὑρεῖν καὶ γεωμετρίαν καὶ ἀστρονομίαν, ἔτι δὲ πεττείας τε καὶ κυβείας καὶ δὴ καὶ γράμματα. βασιλέως δὲ αὖ τότε ὄντος Αἰγύπτου ὅλης Θαμοῦ περὶ τὴν μεγάλην πόλιν τοῦ ἄνω τόπου ἣν οἱ Ἕλληνες Αἰγυπτίας Θήβας καλοῦσι, καὶ τὸν θεὸν Ἄμμωνα, παρὰ τοῦτον ἐλθὼν ὁ Θεὺθ τὰς τέχνας ἀπέδειξε[d] κ̀, τ. λ.

Here, it is observable, as Plato speaks of the Ibis under the name of the bird sacred to Thoth; so on the monuments Thoth is seldom represented except with the head and the beak of this bird, though he has sometimes also the human head and the lunar disk[e]: but his proper and his most characteristic distinction being the head and beak of the Ibis, this is implicitly an argument that, whatsoever

[d] Plato, Opp. pars i. tom. i. 96 (=274.)9. Phædrus.

[e] Wilkinson, Second series, ii. xiii. 6: Bunsen, Book i. sect. vi. B. ii. 393–395: Birch, Egyptian Antiquities, part i. p. 26.

the Egyptians might pretend to the contrary, the true time of the first conception of this character belongs to the æra of the solar calendar; before the lunar, in the shape of the Apis cycle, was yet in existence. *Διὸ καὶ τὸ τῶν γραμμάτων Αἰγύπτιοι πρῶτον Ἶβιν γράφουσιν ὡς Ἑρμεῖ προσήκουσαν*[f]. According to Clemens Alexandrinus, the Ibis itself was one of the hieroglyphical symbols of the moon[g]: *Ἡ δὲ Ἶβις σελήνης, τὰ μὲν σκιερὰ τῷ μέλανι τὰ δὲ φωτεινὰ τῷ λευκῷ τῶν πτίλων εἰκαζόντων*. Also of number, and measure, if not likewise of the ecliptic circle: *Μέτρου γὰρ καὶ ἀριθμοῦ μάλιστα τῶν ζώων ἡ Ἶβις ἀρχὴν παρεσχῆσθαι τοῖς Αἰγυπτίοις δοκεῖ, ὡς τῶν κύκλων ὁ λοξός*[g]. In the Egyptian the name of this bird was *Hip*[h], or *Hib*.

As Plato, in the above passage, associates his first appearance with Egyptian Thebes, so Clemens Alexandrinus calls him a Theban[i]: *Ἀλλὰ καὶ τῶν παρ' Αἰγυπτίοις ἀνθρώπων ποτὲ γενομένων δὲ ἀνθρωπίνῃ δόξῃ θεῶν, Ἑρμῆς τε ὁ Θηβαῖος καὶ Ἀσκληπιὸς ὁ Μεμφίτης*. And though Θεὺθ is the reading of his name in the text of Plato at present, Aristides the Sophist in his time read Θεὼθ there; which comes nearer to Θώθ: *Ἢ εἴ τις αὖ πείθοιτο τὸν Αἰγύπτιον δαίμονα τὸν Θεὼθ, οὕτω γὰρ οὗτος* (sc. *ὁ Πλάτων*) *εἴρηκε τοὔνομα αὐτῷ, τοῦτον περὶ Ναύκρατιν γενέσθαι*[k].

ii. Aristoxenus: *Περὶ ἀριθμητικῆς· Αἰγύπτιοι δὲ Ἑρμοῦ φασιν εὕρημα ὃν καλοῦσι Θώθ*[l]—Quartus (sc. Mercurius) Nilo patre quem Ægyptii nefas habent nominare: quintus quem colunt Pheneatæ, qui et Argum dicitur interemisse, ob eamque causam Ægyptum profugisse, atque Ægyptiis leges et litteras tradidisse. hunc Ægyptii Thoth appellant, eodemque nomine anni primus mensis apud eos vocatur[m]—Nonnulli tamen quatuor Mercurios tradunt ... quartum Cyllenii filium ... a quo Argus clam occisus est, qui hoc metu in Ægyptum profugit, et ibi invenisse primum disciplinam litterarum et numerum dicitur: qui lingua Ægyptiorum Thoth appel-

f Plutarch, Symposiaca, lib. ix. quæstio iii. cap. ii: cf. Horapollo, i. 10. 36: Lydus, De Mensibus, iv. 52. p. 89. l. 14–90. 14.

g Stromatum v. cap. vii. § 44. p. 32. l. 14.

h Wilkinson, Second series, ii. xiii. 217: Birch, Egyptian Antiquities, part i. 56: Bunsen, Book i. App. i. Vocabulary, No. 171. p. 463.

i Stromatum i. xxi. § 134. p. 90. l. 7.

k xlvi. 372. 1: cf. Clemens Alex. Strom. i. xv. § 68. p. 49. l. 15.

l Stobæus, Eclogæ Physicæ, i. 16. cap. ii. 6.

m Cicero, De Natura Deorum, iii. 22. § 56: cf. Lydus, De Mensibus, iv. 44. p. 79. l. 3.

latur, de cujus nomine etiam mensis dictus est[n]—Has autem Græcas (litteras) Mercurius in Ægyptum primus detulisse dicitur[o]—Et enumeratis per ordinem quatuor, quintum fuisse eum a quo occisus sit Argus (ait Cotta apud Ciceronem): ob eamque causam in Ægyptum profugisse, atque Ægyptiis leges ac litteras tradidisse. hunc Ægyptii Thoth appellant: a quo apud eos primus anni sui mensis, id est September, nomen accepit[p]. This Hermes Lactantius supposes to have been the founder of Hermupolis, in the Saïte nome; and the same with Trismegistus, whom he often quotes. But Trismegistus was the first Hermes, and, as the Egyptians pretended, the father of this second one.

iii. Varro attributed the discovery of letters, among the Egyptians, to Isis, only 2000 years before his own time[q]. This would suppose Isis and Thoth to have come into existence together: and that would probably be true. Principes Dei...Taautes et Astarte apud Phœnices, ut iidem principes in Latio Saturnus et Ops.[r] According to Herennius Philo, the translator of Sanchoniatho[s], this latter derived his materials from the *ὑπομνήματα*, (commentaries, memoirs, or records,) of *Τάαυτος* or Thoth: *Ἃ πολυφροντιστικῶς ἐξεμάστευσεν...εἰδὼς ὅτι τῶν ὑφ' ἡλίῳ γεγονότων πρῶτός ἐστι Τάαυτος ὁ τῶν γραμμάτων τὴν εὕρεσιν ἐπινοήσας, καὶ τῆς τῶν ὑπομνημάτων γραφῆς κατάρξας, καὶ ἀπὸ τοῦδε ὥσπερ κρηπῖδα βαλόμενος τοῦ λόγου· ὃν Αἰγύπτιοι μὲν ἐκάλεσαν Θωὺθ, Ἀλεξανδρεῖς δὲ Θὼθ, Ἑρμῆν δὲ Ἕλληνες μετέφρασαν*[t]. These memoirs of Taautus Sanchoniatho met with, *συμβαλὼν τοῖς ἀπὸ (ἐπὶ) τῶν ἀδύτων εὑρεθεῖσιν ἀποκρύφοις Ἀμμουνέων γράμμασι συγκειμένοις, ἃ δὴ οὐκ ἦν πᾶσι γνώριμα*[t]: which, if it be meant of the temple of Ammon of Thebes, or of Ammon of Lybia, as we shall see hereafter, betrays the secret of their forgery, and of the imposture practised in the name of this Sanchoniatho. This Taautus or Thoth however was represented by him as the son of Misor (Mizraim—the Scriptural name for one of the sons of Ham, who gave his name to Egypt): *Ἀπὸ Μίσορ*

[n] Servius, ad Æneid. iv. 577.
[o] Hyginus, Fabulæ, cclxxvii.
[p] Lactantius, i. vi.: cf. vii. xiii. and Arnobius, iv. 135.
[q] Apud Augustin. De Civitate Dei, xviii. 40.
[r] Varro, De Lingua Lat. iv. p. 17.
[s] Eusebius, Præparatio Evang. i. ix. § 21. p. 67, 68: x. § 24. p. 69: § 53. p. 94: x. ix. § 12. p. 501.
[t] Eusebius, Præp. Evang. i. ix. § 24. p. 69: § 26. p. 70.

Τάαυτος, ὃς εὗρε τὴν τῶν πρώτων στοιχείων γραφήν (letters of the alphabet:) *ὃν Αἰγύπτιοι μὲν Θωὺρ* (*Θωὺθ*) *Ἀλεξανδρεῖς δὲ Θωὺθ* (*Θὼθ*) *"Ἕλληνες δὲ Ἑρμῆν ἐκάλεσαν"*.

The distinction thus pointed out between the Alexandrine name of Thoth, and the Egyptian in its Greek form, is just. Hence also Suidas: *Θὼθ ὁ Ἑρμῆς—Θωὺθ καὶ Θὼθ, ὁ Ἑρμῆς.* It is illustrated by the following passage of Marcianus Capella[w], alluding to the name of Mercury in this Alexandrine form of *Θωὺθ*, and to its numeral value in Greek characters: Ex quo finalem utrinque litteram sumit[x], quæ numeri primum perfectumque terminum claudit. dehinc illud[y] quod in fanis omnibus soliditate cubica dominus adoratur. litteram quoque[z], quam vim mortalitatis asserere prudens Samius (Pythagoras) existimavit, in locum proximum sumit; ac sic mille ducenti decem et octo[a] numeri effulserunt.

In the hieroglyphical character however the name of Thoth appears to be read Taut[aa] or Tet: and this name occurs in the form of Tot, Thot, Taaut, and Theuth[b], as much as of Thoth or Thoÿth. In the Hermes Trismegistus, (still extant in part, both in Greek and in the Latin version of Apuleius,) the principal speaker is a certain Hermes, who is represented as the son of Hermes Trismegistus[c], and is called Tat. Another party in the dialogue is sometimes called Asclepius, sometimes Tat[d]. Apuleius also calls him Tati[e]: and both Tat and Tati come nearer to the monumetal Tet than Thoth. Varro called him Taautes: and Sanchoniatho Taautos or Tauthos. In the Chronicon of Jerome we read, [f]His temporibus Tat filius Hermetis Tris-

[u] i. x. § 14. p. 79. See again the name of *Ταυθὸς* as the same with that of *Θωὺθ*, i. cap. 10. § 43. p. 89, from Porphyry.

To this *Τάαυτος* or Tauthus Sanchoniatho attributed the invention of hieroglyphics too, in the time of Kronos or Saturn (i. x. § 36. p. 86: § 38. p. 87: § 46. p. 91.)—which Kronos, from the facts of his history, especially from the sacrifice of his son, could not have been older than Abraham; and must in reality have been younger. Sanchoniatho made his Thoth a Phœnician: how justly, we must leave him to settle with the Egyptians as well as he can.

[w] Lib. ii. 25.

[x] ΘΘ = 9 + 9 = 18.

[y] Ω = 800.

[z] Υ = 400.

[a] ΘΩΥΘ = 1218.

[aa] Wilkinson, First series, ii. xiii. 2–12.

[b] Bunsen, Book i. App. vi. B. ii. p. 393: Birch, Egyptian Antiquities, part i. p. 26.

[c] Stobæus, Eclogæ Physicæ, i. lii. 40. p. 932.

[d] Ibid. i. xxii. 9. p. 470: xliii. 8. p. 744: cf. Syncellus, p. 72. l. 19.

[e] Opp. ii. 317. 324.

[f] Thesaurus Temp. ad ann. 556.

megisti fuisse dignoscitur. The Coptic name of the first month is still Toot[g]; very little different from Taaut or Tot. Pliny calls the first month in the Egyptian calendar Thiatis[h]; and here too there is a various reading in his text of Toti, which is much more likely to be the true one.

iv. *Πέμπτος δὲ Ἑρμοῦ στίλβων· ... τῷ δὲ Ἑρμῇ ἐδόθη διὰ τὸ πρῶτον αὐτὸν διάκοσμον ὁρίσαι τοῦ οὐρανοῦ, καὶ τῶν ἄστρων τὰς τάξεις καὶ τὰς ὥρας μετρῆσαι, καὶ ἐπισημασιῶν καιροὺς δεῖξαι*[i]— Hæc autem Mercurio data existimatur, quod primus menses instituerit et perviderit siderum cursus[j].

v. Quod nec Mercurius ille Trismegistus magister omnium physicorum recogitavit[k]—Quando siderum motus aut ratio cœpta est genethliaca sciri? non post Theutin Ægyptium aut post Atlantem, ut quidam ferunt, bajulum illum cœli[l]?—Τὰς *μὲν οὖν ὅλας Ἑρμῆς ἐν ταῖς δισμυρίαις βίβλοις ὡς Σέλευκος ἀπεγράψατο, ἢ ταῖς τρισμυρίαις τε καὶ ἑξακισχιλίαις καὶ πεντακοσίαις καὶ εἴκοσι πέντε, ὡς Μανεθῶς ἱστορεῖ, τελέως ἀνέδειξε*[m]. And yet the whole of the ritual, learning, and science of the Egyptians, on all points, derived from Thoth, according to Clemens Alexandrinus*, was summed up in

* The account, which Clemens Alexandrinus gives of the learning and philosophy of the Egyptians, as contained in the books ascribed to Thoth or Hermes, is as follows: Strom. vi. iv. § 35. p. 118. l. 20. Cf. Porphyry De Abstinentia, iv. 8. 321.

Μετίασι γὰρ οἰκείαν τινὰ φιλοσοφίαν Αἰγύπτιοι. αὐτίκα τοῦτο ἐμφαίνει μάλιστα ἡ ἱεροπρεπὴς αὐτῶν θρησκεία.

Πρῶτος μὲν γὰρ προέρχεται ὁ ᾠδός. . .τοῦτόν φασι δύο βίβλους ἀνειληφέναι δεῖν ἐκ τῶν Ἑρμοῦ, ὧν θάτερον μὲν ὕμνους περιέχει θεῶν, (cf. Diodorus, i. 72.) *ἐκλογισμὸν δὲ βασιλικοῦ βίου τὸ δεύτερον. μετὰ δὲ τὸν ᾠδὸν ὁ ὡροσκόπος, ὡρολόγιόν τε μετὰ χεῖρα καὶ φοίνικα ἀστρολογίας ἔχων σύμβολα, πρόεισιν. τοῦτον τὰ ἀστρολογούμενα τῶν Ἑρμοῦ βιβλίων τέσσαρα ὄντα τὸν ἀριθμὸν ἀεὶ διὰ στόματος ἔχειν χρή· ὧν τὸ μέν ἐστι περὶ τοῦ διακόσμου τῶν ἀπλανῶν φαινομένων ἄστρων, τὸ δὲ περὶ τῶν συνόδων καὶ φωτισμῶν ἡλίου καὶ σελήνης, τὸ δὲ λοιπὸν περὶ τῶν ἀνατολῶν.*

—§ 36. p. 119. l. 4: *Ἑξῆς δὲ ὁ ἱερογραμματεὺς προέρχεται, ἔχων πτερὰ ἐπὶ τῆς κεφαλῆς, βιβλίον τε ἐν χερσὶ καὶ κανόνα ἐν ᾧ τό τε γραφικὸν μέλαν καὶ σχοῖνος ᾗ γράφουσι.* (cf. Horapollo, i. 14. 38.) *τοῦτον τά τε ἱερογλυφικὰ*

g Wilkinson, Second series, i. xi. 14.
h H. N. xxvii. 80.
i Eratosthenes, Καταστερισμοὶ, 43. p. 135: Πέντε ἀστέρες, the five planets.
j Hyginus, Astronom. Poet. i. xlii.
k Tertullian, ii. 165: Adversus Valentinianos, 15.
l Arnobius, ii. 92.
m Iamblichus, De Mysteriis, sect. viii. cap. i. p. 157. l. 20.

no more than 42 Books ascribed to him; which this dealer in wholesale lying and imposition, Manetho, thus swelled out to 36,525; one for each year of the Sothiacal period multiplied by the Apis cycle.

There cannot be any reasonable doubt, we think, after these various testimonies, that the name of the first month in the Egyptian calendar was taken from that of this Thoth; whether it was most properly so to be pronounced and so to be written, or in any other way. Consequently that this name could have had no reference to the seasons of the natural year, or to any natural characteristic thereof: it must have been purely a personal designation, and either religious or historical. It has been imagined that the root of this name in the Egyptian was some word which had the sense of λόγος (word, or reason) in that language. We should think it much more probable that the Egyptian term for word or reason was derived from the name of Thoth; who passed with them for the personification of reason and language itself. It has been asserted too that the name of Thoth was given to the dog-star: and it might have been so given, if the star itself rose heliacally on the first of Thoth, at so

καλούμενα. . .εἰδέναι χρή. ἔπειτα ὁ στολιστὴς. . .ἔχων τόν τε τῆς δικαιοσύνης πῆχυν καὶ τὸ σπονδεῖον. οὗτος τὰ παιδευτικὰ πάντα καὶ μοσχοσφραγιστικὰ καλούμενα, δέκα δέ ἐστι τὰ εἰς τὴν τιμὴν ἀνήκοντα τῶν παρ' αὐτοῖς θεῶν κ', τ. λ.

§ 37. Ἐπὶ πᾶσι δὲ ὁ προφήτης ἔξεισι, προφανὲς τὸ ὑδρεῖον ἐγκεκολπισμένος, ᾧ ἕπονται οἱ τὴν ἔκπεμψιν τῶν ἄρτων βαστάζοντες. οὗτος. . τὰ ἱερατικὰ καλούμενα ι' βιβλία ἐκμανθάνει. . .δύο μὲν οὖν καὶ τεσσαράκοντα αἱ πάνυ ἀναγκαῖαι τῷ Ἑρμῇ γεγόνασι βίβλοι. ὧν τὰς μὲν λς' τὴν πᾶσαν Αἰγυπτίων περιελοῦσας φιλοσοφίαν οἱ προειρημένοι ἐκμανθάνουσι, τὰς δὲ λοιπὰς ἓξ οἱ παστοφόροι, ἰατρικὰς οὔσας κ', τ. λ.

Horapollo, i. 38: Ἀφ' οὗ καὶ ἡ παιδεία παρ' αὐτοῖς σβὼ καλεῖται, ὅπερ ἐστὶν ἑρμηνευθὲν πλήρης τροφή.—

Ibid. Ἔστι δὲ παρὰ τοῖς ἱερογραμματεῦσι καὶ βίβλος ἱερὰ, καλουμένη ἀμβρῆς, δι' ἧς κρίνουσι τὸν κατακλιθέντα ἄρρωστον.

With regard to the feathers on the head of the hierogrammateus, and the palm-branch, one of the insignia of the horoscopus, the following passage of Diodorus, i. 87, will throw some light upon them: Τινὲς δέ φασιν ἐν τοῖς ἀρχαίοις χρόνοις ἱέρακα βιβλίον ἐνεγκεῖν εἰς Θήβας τοῖς ἱερεῦσι φοινικῷ ῥάμματι περιειλημένον, ἔχον γεγραμμένας τὰς τῶν θεῶν θεραπείας τε καὶ τιμάς· διόπερ καὶ τοὺς ἱερογραμματεῖς φορεῖν φοινικοῦν ῥάμμα, καὶ πτερὸν ἱέρακος ἐπὶ τῆς κεφαλῆς.

memorable an epoch as that of the Sothiacal period. But we have met with no proof ourselves of such an application of the name; and we should be of opinion that it has been imagined merely from the resemblance of the name of the dog-star Sothis to this of Thoth.

With regard to the rest of the names of the months, as we have observed, we think it better to be silent concerning them, than to propose conjectures only. The name of Φαμενὼθ the seventh month resembles Φαμενώφ; and that was one of the names of Memnon among the Egyptians, as we learn from Pausanias[n]: Ἀλλὰ γὰρ οὐ Μέμνονα οἱ Θηβαῖοι λέγουσι Φαμένωφα δὲ εἶναι τὸν ἐγχώριον οὗ τοῦτο ἄγαλμα ἦν: as also from an inscription on the statue of Memnon itself, in the 15th year of Adrian[o]. But the name of the month no where occurs in the form of Φαμενώφ. In like manner, the name of Ἐπιφὶ the xith month at first sight might be supposed to have some connection with the Greek name of the Apis, in the form of Ἔπαφος. But the middle syllable of Ἐπιφὶ is always long. It occurs too in the form of Ἐπὶφ or Ἐπεὶφ, as well as in that of Ἐπιφί: and in the Coptic it is Epip at present.

In short the only other name, concerning which we might venture to offer an opinion, is that of the last month, Mesore. This appears to have been pronounced and written both Μεσορὴ, Μεσορὲ, and Μεσορί; and Μέσερ according to Suidas was one of the names of Egypt[p]. The Scriptural name of Egypt is Mizraim, or Mezraim, after Mizraim or Mezraim the son of Ham[q], who must have been the first of the children of Noah to settle there. Taautes or Thoth was represented by Sanchoniatho as the son of Misor; which is probably nothing different from Mesore. We incline to the opinion that the name of the last month in the Egyptian calendar was actually taken from the traditionary and patriarchal name of Egypt, Mizraim or Mezraim itself; and that while the first month was called after Thoth, the reputed first author of society and civilization, the last was dedicated

[n] i. xlii. 2. cf. Syncellus, i. 133. l. 16.

[o] See our Dissertations, iv. 514. App. Diss. xxiv. cf. also Corpus Ins. iii. pars xxix. 373. No. 4731: 370. No 4727.

[p] Cf. in Μεσρέμ and in Χὰμ σκηνώματα.

[q] Gen. x. 6. 13.

to the land of Egypt itself, in which society and civilization, under the auspices of this Thoth, as it would thus be implied, first came into existence.

With regard to the last five days of the calendar, it does not appear that they ever received a proper name of any kind. In the fable, relating to their supposed origin, they were styled simply the epagomenæ; Ἃς νῦν ἐπαγομένας Αἰγύπτιοι καλοῦσι. They are never specified by Hipparchus or Ptolemy, like other Egyptian dates, under an Egyptian name; but always in this Greek form of one or other of the epagomenæ. They appear at the end of Ptolemy's calendar, De Apparentiis, simply as the epagomenæ. They have no proper name in the Coptic calendar at present, unless it be that of *mensis parvus* [r], or one borrowed from the Arabic. El Nesî, in the sense of intercalary—from Nesâ *retardare*. This term resembles Μεισὶ, an Egyptian word, which occurs in Horapollo [s], but in a totally different sense; if, as he explains it, Μεισὶ was the Egyptian for "a serpent."

SECTION VI.—*On the orthography of the names of the Egyptian months.*

The names of the Egyptian months, which occur in the Magna Compositio, as they were commonly written and pronounced in Greek in Ptolemy's time, have been produced elsewhere [t]. Every one of them is there to be found once at least, if not oftener, the Epagomenæ not excepted; and had we been left to make out the order in which they must have followed each other in their proper calendar, from these data only, it might have been effected. And according to Mr. Ideler it has actually been effected by the Italian Averani, of Florence; though as he justly observes, it was a superfluous labour; seeing that Ptolemy himself, in his own calendar De Apparentiis, had already done the same thing by exhibiting all the months of the Egyptian calendar in their proper order, along with the Roman or Julian also to which they corresponded. And though the Egyptian calendar, there exhibited, is the Alexandrine; that makes no difference either to the names or to the order of the months themselves,

[r] Lepsius, Einleitung, p. 145. 147. [s] i. 59. [t] Diss. xii. ch. ii. sect. ii. vol. ii. 409.

which were always the same in the equable as in the Alexandrine calendar, and *vice versa*. In fact, as we have often had occasion to observe, B. C. 26, the Alexandrine calendar, and the native Egyptian or primitive equable calendar of Egypt, in all but the names of the months in the former, as modified in passing from the Egyptian to the Greek, were absolutely the same.

Alexandrine calendar, compared with the Julian, in Ptolemy, De Apparentiis[t].

Months.			Months.		
i.	Μὴν Θὼθ ἤτοι	Σεπτέμβριος.	vii.	Μὴν Μάρτιος	Φαμενώθ.
ii.	Φαωφὶ τουτέστιν	Ὀκτώβριος.	viii.	Μὴν Ἀπρίλιος ἢ	Φαρμουθί.
iii.	Μὴν Νοέμβριος	Ἀθύρ.	ix.	Μὴν Μάϊος	Παχών.
iv.	Μὴν Χοιὰκ	Δεκέμβριος.	x.	Μὴν Ἰούνιος	Παϋνί.
v.	Μὴν Ἰανουάριος ἢ	Τυβί.	xi.	Μὴν Ἰούλιος	Ἐπιφί.
vi.	Μὴν Φεβρουάριος	Μεχίρ.	xii.	Μὴν Αὔγουστος	Μεσορί.
		xiii. Ἐπαγομένων α' &c.			

In an extract from one of the MSS. in the royal (or national) library at Paris, which the abbé Halma has premised to his edition of Ptolemy, the names, order, and orthography of these months stand as follows[u].

Θὼθ	Φαωφὶ	Ἀθὺρ	Χοϊάκ.
Τυβὶ	Μεχὶρ	Φαμενὼθ	Φαρμουθί.
Παχὼμ	Παϋνὶ	Ἐπιφὶ	Μεσορῆ.
	ε' Ἐπαγόμεναι ἡμέραι.		

In an epigram of the Greek Anthologia[w] we have them all enumerated and described by certain characters; which must be understood to hold good only of their sites in the Julian, that is, the fixed, calendar; viz. the Alexandrine: but the names and order of the same months are just as true of the equable calendar.

Μῆνες Αἰγυπτίων. August 30 or 29.

Πρῶτος Θὼθ ἐδάη δρεπάνην ἐπὶ βότρυν ἐγείρειν.
Ἰχθυβόλοισι Παωφὶ φέρει πανδήμιον ἄγρην.
Πληϊάδων φαίνουσαν Ἀθὺρ τεκμαίρεται ὥρην.
Χοιὰκ σπειρομένων σταχύων δείκνυσι γενέθλην.
Τυβὶ δὲ πορφύρεον βουληφόρον εἶμα τιταίνει.

t Uranologium, p. 71–92.

u Opp. i. Preface, p. lxx. MS. 2399. Cf. Opp. vi. 72. 124. second part. In the former (p. 72.) we have Παχὼμ also; but Μεσορὶ for Μεσορῆ: in the latter we have Παχὼν and Μεσωρί; and Φαωθὶ for Φαωφὶ, which must be simply an error of the scribe.

w iii. 211. Μῆνες Αἰγυπτίων.

σημαίνει πλωτῆρσι Μεχεὶρ πλόον ἀμφιπολεύειν.
῎Αρεος ὅπλα φέρειν Φαμενὼθ δείκνυσι μαχηταῖς.
εἰαρινῶν Φαρμουθὶ ῥόδων πρωτάγγελός ἐστι.
λήϊα δ' αὐανθέντα Παχὼν δρεπάνοισι φυλάσσει.
εὐκάρπου δὲ Παϋνὶ προάγγελός ἐστιν ὀπώρης.
καὶ σταφυλὴν κατέχων εὐάμπελός ἐστιν[u] *᾿Επιφί.*
καὶ Μεσορὶ Νείλοιο φέρει φυσίζοον ὕδωρ.

There is in fact no calendar of antiquity, types of which are so repeatedly to be met with, as of this Egyptian one of the Alexandrine Greeks; from which the names, the order, and the mode of writing and reading the vernacular appellations of the months of the equable calendar itself in the Greek character might be collected. It is superfluous therefore to multiply specimens of this kind. We will notice only (and in brief) such instances of these names as have occurred to us *inter legendum*, sometimes with variations in the orthography and enunciation.

In the Rosetta inscription[x] we meet with Θωὺθ[y], Μεχεὶρ[z], Μεσορή[a]. In the Papyrus Taurinensis Prima[b] we find Θωὼθ[c], ῎Αθυρ[d], Μεχεὶρ[e], Φαοφὶ[f], Φαμενὼθ[g], Παχὼν[h], Παϋνὶ[i], Μεσορή[k]: in the Papyrus Tertia[l] we have Θωύθ[m]: in the Papyrus Quarta[n] we have ᾿Επεὶφ[o], Μεσορή[p]: in the Papyrus Septima[q] we find Παϋνί[r]: in the Papyrus Prima Zoïdis[s] Φαρμουθὶ occurs seven times: in the Pactio Nechitis[t] we have Τυβὶ and Φαρμουθί: in the Pactio Osiridis[u] we find ᾿Επιφί: in the Antigraphum Greyanum[w] we have ᾿Αθὺρ twice, and Χοιάκ[x]: in the Mandatum Comprehensorium, (or writ to arrest a runaway slave[y],) ᾿Επεὶφ occurs again. In like manner, in the Recueil des Inscriptions of Mons. Le Tronne, we meet with Θωὺθ[z], Φαωφὶ[a], ᾿Αθὺρ[b], Φαμεν(ὼθ[c]), Φαρμουθὶ[d], Παχὼν[e], ᾿Επεὶφ[f], Μεσορή[g].

Plutarch also, De Iside et Osiride, mentions several of

[u] Lege *εἶσιν*. [x] See the Recueil of M. Le Tronne. Also the Hermapion of Mr. Ideler, jun., Appendix, ii. [y] Hermapion, ii. 14, ver. 50. [z] 12, ver. 6. [a] 13, ver. 46. [b] Ib. Appendix, v. [c] Ib. 19. l. 14. ad dextram. [d] Ib. 15. 1. [e] Ibid. l. 16. [f] Ibid. 17, 16. ad sin. [g] Ibid. 16, 33. [h] Ibid. 16, 9: 18, 5. [i] Ib. 20, 33. [k] Ibid. 18, 14. [l] Ibid. Appendix, vii. [m] 22, 25. [n] Ibid. Appendix, viii. [o] 22, 12. [p] 22, 1. [q] Ibid. Appendix, ix. [r] 23, 18. [s] Ibid. Appendix, x. p. 23. [t] Ibid. xi. p. 24. [u] Ibid. xii. 25. [w] Ibid. xiii. 25. [x] p. 26. [y] Ibid. xv. 26. [z] ix. 81. [a] ix. 83. [b] x. 90. [c] xxiv. 230. [d] xvi. 153. [e] xiii. 106: xiv. 121: xviii. 204. xxiii. 226. xxvii. 358. [f] xxxiii 407, 408. [g] xv. 125: xxv. l. 46. 250.

these months by name: as, *Ἕκτῃ μηνὸς ἱσταμένου Φαωφί*[h]—*Τῇ δὲ ὀγδόῃ φθίνοντος τοῦ Φαωφί*[i]—*Καὶ τοῦ Φαωφὶ μηνός*[k]—*Ἑβδόμῃ ἐπὶ δέκα μηνὸς Ἀθύρ*[l]—*Ὃν Ἀθὺρ Αἰγύπτιοι*[m]—*Διὸ μηνὸς Ἀθύρ*[n]—*Ἑβδόμῃ τοῦ Τυβὶ μηνὸς*[o]—*Τῇ νουμηνίᾳ τοῦ Φαμενώθ*[p]—*Τοῦ τε Παϋνὶ . . μηνός*[q]—*Καὶ τῇ τριακάδι τοῦ Ἐπιφὶ μηνός*[r]—*Ἐν δὲ τῷ Μεσορὴ μηνί*[s]. Josephus, speaking of Nisan, has *Ὃς παρὰ μὲν Αἰγυπτίοις Φαρμουθὶ καλεῖται*[t]: Clemens Alexandrinus has *Τυβὶ, Φαμενὼθ, Φαρμουθὶ, Πάχων*[u]: Pliny the Elder mentions Tybi and Mechir, as consecutive months[v], and Thoth, as we have seen[x], under the form of Thiatis or Toti: the Marmor Tripolitanum has *Φαῶφ*[y], for *Φαωφί*: Epiphanius has *Μεσορί*[z]; as also the author of the Philopatris ascribed to Lucian[a].

We may conclude then that, with respect to the names of Athyr, Chœac, Tybi, Phamenoth, and Pharmuthi, there can be no reason to doubt concerning the mode either of writing or of pronouncing them, in the Greek at least: that, as to the rest, the Egyptian form of Thoth in Greek is *Θωὺθ*, the Alexandrine is *Θώθ*: of *Φαωφὶ* it may be doubtful whether it should not be *Παωφὶ*, though there seems to be better authority for the former. In the name of *Παχὼν* too, or Pachon, there seems to be no variation. *Παϋνὶ* is always, or should be always, trisyllabic. On the monuments it occurs in the form of Paöni—in which however we apprehend the middle syllable must also be long, as in Paūni. *Ἐπιφὶ* occurs as *Ἐπείφ*; and in our opinion it should always be written *Ἐπειφὶ*—the middle syllable being invariably long, and, as we apprehend, a diphthong. *Μεχὶρ* too, in our opinion, would always be more correctly written *Μεχείρ*; and for the same reason; because the last syllable is invariably long, and because it seems to have been a diphthong also. In the Coptic and Arabic this name at present is Amschir; the letters in the first syllable having been inverted, but the original pronunciation of the last syllable, in all probability, being correctly retained. With regard to Mesore, it is difficult to decide

h Cap. lxv. i lii. k xxx. l xiii. m lxix. n xxxix. o l. p xliii. q xxx. r lii. s cxviii. In his Life of Romulus, xii. he has *Θὼθ, Χοιὰκ, Φαρμουθί*. t Ant. Jud. ii. xiv. 6. Cf. Suidas, in *Φαρμουθί*: *ὁ κατὰ Ῥωμαίους Ἀπρίλλιος*. u Strom. i. xxi. §. 145. §. 146. p. 98. Cf. our Prolegomena, cap. iii. p. 127. v H. N. vi. 26. p. 672. x Supra, p. 188. y See our Prolegomena, cap. iii. 154. z Adv. Hæreses, Opp. i. 29. C—D: Sebuæi. a Cap. 22. Opp. iii. 610. l. 26.

whether it ought to be Μεσορὲ, Μεσορὴ, or Μεσορί: and whether Μεσορὴ or Μεσορῆ. Μεσωρὶ sometimes occurs; but it must be a corruption of Μεσορί. We incline to the opinion that this name in the Egyptian was most properly Μεσορέ; but that the final syllable was always long. It is observable that, while the other names ending in ι are often abbreviated, Mesore, even as written Μεσορὶ, has the last syllable long. Thus, in an epigram of the Greek Anthology on a bath, as we must suppose in Alexandria, which was full of draughts or currents of cold air[b]:

> Φρίξου καὶ Νάρκης οὗτος τόπος· ἀλλ' ἐπίγραψον·
> Τῷ Μεσορὶ λοῦσαι· πνεῖ γὰρ ἔσω Βορέας.—Ver. 8.

From which we must infer too that Mesore, (the limits of which in the Alexandrine Calendar were July 25 and August 24,) was notoriously the hottest month in the year; and would have been intolerable in Egypt, but for the Etesian winds, which blew all through that month.

CHAPTER II.

On the testimonies extant to the Julian year in Egypt.

SECTION I.—*The principle of the Julian year embodied in corrections of the primitive calendar.*

The principle of the mean Julian year is necessarily embodied in the cyclico-Julian correction of the primitive equable year. It requires no argument therefore to prove that every correction of this kind presupposes a knowledge of the mean Julian year. The earliest correction of that description, which the history of the calendar brings to light, is the Hindu, of the date of B.C. 1306. So far back then must the principle of the mean Julian year, and the mode of combining it with the simple equable principle, and of applying both in conjunction to the regulation of civil or calendar time, have been already understood.

The same remark may be made, and even more obviously, on the octaëteric corrections of the primitive solar year. No

[b] iv. 135. 'Αδέσποτα, lxxxiv. Εἰς βαλανεῖον ψυχρόν.

one requires to be told that the mean Julian year is the basis of the octaëteric cycle. The first authors of that combination of lunar with solar and of solar with lunar time, whosoever they were, must have had a perfect knowledge of the mean Julian year. And the antiquity of this cycle is unquestionable. It is almost as ancient as the cyclico-Julian correction of the primitive solar year itself. The oldest correction of this kind, as we have stated, is that of B. C. 1306: the oldest octaëteric correction is only 45 years later, B. C. 1261. And what is most extraordinary, and most contrary to the prejudices and belief of the learned on such points as these, hitherto, it was the work of the Greeks, and, if we are not mistaken, of Minos, the king and legislator of Crete: from which fact we ourselves can draw no inference but one; viz. that Minos, the author of the oldest octaëteric correction of which any thing is discoverable, was most probably the first to find out and to contrive that cycle itself. It is certain at least that he was the author of a cycle of this denomination among the Greeks; from which also many others, of great antiquity in themselves, but none of them so old as this, appear to have been derived. There can be no question that this octaëteric cycle of Minos in Crete, and the Olympic cycle of Pelops his contemporary in the Peloponnese, both came into existence together in the same year, B. C. 1261. And the latter, as we have already observed, was a purely Julian cycle; and so little different from the Julian one of Cæsar himself, that had it only been attached to March 1, instead of to June 25, B. C. 1261, it would have been the Julian cycle and the Julian correction. Who then in the face of such facts as these, (unless they can be disproved, and shewn to be false,) could think of denying either to Minos or to Pelops as perfect a knowledge of the mean Julian year, as could have been possessed even by Cæsar himself? yet 1200 years and upwards before the time of Cæsar notwithstanding.

What shall we say too to the correction of Numa Pompilius among the Romans themselves, 667 years before the Julian? Could that correction be based on the octaëteric cycle, and not on the mean Julian year also? Was it accident, or was it contrivance, which made the εἰκοσιτετραετηρὶς of Numa a perfect measure of 24 mean Julian years? In

short, not to multiply appeals of this kind to the evidence of one calendar after another; we cannot but be astonished at the incredulity of learned men, which for some reason or other has so obstinately refused to admit either the knowledge of the principle of the Julian year in theory, or its application in practice, any where before the time of the dictator Cæsar: and in particular among the Egyptians, of whom it was least of all to be called in question; and from whom, and through whom, the first idea of the same thing in all probability was derived to the rest of the ancient world.

The love of paradox and the affectation of singularity will often make men maintain opinions contrary to the truth. Nor are the most learned men the most remarkable for common sense; nor are they free from the influence of prejudice even when they affect to be superior to it; nor is their very scepticism on some points without a mixture of credulity on others. Arguments can never be wanting to cast doubts on notorious matters of fact. Reasons may always be imagined why something, which certainly happened, could not, or should not, or ought not, to have happened. Yet notwithstanding nothing can decide a question of fact, but testimony, competent testimony. It is only in the school of modern historical scepticism, founded by Niebuhr, that questions of fact are decided on any other principle; and that the history of the past is judged of not by the fact of what has happened but by the probability or improbability of its happening. Everywhere, except in this school, it is recognised as a principle that questions of fact must be decided by testimony, not by arguments; and everywhere else but in this school, (and even among the advocates of this school, in the ordinary affairs of life,) competent testimony, to whatsoever it is given, in spite of all sophistries and of all probabilities to the contrary, is believed and acted upon.

There was always, in our opinion, testimony extant, sufficient to have satisfied learned men, if their own prepossessions and prejudices had permitted it, of both these facts; both that the principle of the Julian year must have been well understood in Egypt long before the time of Julius Cæsar; and that the Egyptians must have had one Julian calendar at least among them, from as far back as the epoch of the

Sothiacal period, attached to the stated date of the heliacal rising of Sirius; and consequently the same with that to which we have given the name of the Sothiacal Type of that kind. These testimonies, and to each of these points, we shall proceed briefly to notice; though, as far as the proof of either of those facts themselves is concerned, we trust we have done enough already to establish each; and therefore that for that particular purpose any further argument might be considered superfluous.

SECTION II.—*On the extant testimonies to the knowledge of the Julian year in Egypt in general.*

i. The testimony of Diodorus Siculus and Strabo is express to the first of these points: but as it is given with a special reference to the case of the Egyptian Thebans, and to the fact of the knowledge and of the application of the Julian principle of the reckoning of annual time among them in particular; we reserve it for the present.

ii. The Egyptian account of the origin of their epagomenæ has already been submitted to our readers[d]. There could be no correction of their calendar, historically known among them, in any shape, more ancient than the first institution of these epagomenæ; according to this account at least. If so, it must be purely a falsehood, which is asserted by Syncellus, probably on the authority of Manetho[e], that these epagomenæ themselves were first added to the year in the reign of a king whom he styles Aseth; the 32d on his list; and that the year before consisted only of 360 days. This statement is not found in the remains of Manetho at present; yet it may be inferred from the Scholia on the Timæus of Plato[f], that something of the kind was once to be read in Manetho of a king of the xviith dynasty[g] whom he called Σαΐτης. This part of the Scholia is corrupt; though it might easily be amended. Neither of these statements in itself is entitled to the least degree of credit. The equable year never had an historical beginning in Egypt, short of the beginning of all things: the year of 360 days never had an

[d] Vol. iii. 140. Diss. xiv. ch. v. sect. i. sqq.

[e] 232. 17. 233. 2. Cf. the Hermapion of Mr. Ideler jun. xxi. p. 43.

[f] ii. 424, 425. 12. 3.

[g] Hermapion, App. xx. 37. Dynastia, xv. α. Cf. xxi. 42. κς΄.

existence in Egypt at all. But the Julian year must have had an historical beginning even in Egypt; which this monumental chronology, whether on purpose, or through some confusion of its own, might actually date in the reign of this Aseth, in which too, according to Syncellus, it dated the deification of the Apis: and the institution of the Julian year, with six epagomenæ at stated times instead of five, might be confounded with the institution of the epagomenæ.

iii. Theodore Gaza ascribes the discovery of the mean Julian year, (365 days at one time, 366 at another,) to the Egyptians[h]; from whom he supposes it to have passed to the Greeks through Eudoxus and Plato. Gaza, in this instance, is only repeating the testimony of Strabo; who also supposes Eudoxus and Plato to have been 13 years resident in Egypt; paying court to the priests of Egypt, in order to discover this and other like secrets of theirs[i]: *Περιττοὺς γὰρ ὄντας κατὰ τὴν ἐπιστήμην τῶν οὐρανίων, μυστικοὺς δὲ καὶ δυσμεταδότους, τῷ χρόνῳ καὶ ταῖς θεραπείαις ἐξελιπάρησαν ὥστε τινὰ τῶν θεωρημάτων ἱστορῆσαι· τὰ πολλὰ δὲ ἀπεκρύψαντο οἱ βάρβαροι. οὗτοι δὲ τὰ ἐπιτρέχοντα τῆς ἡμέρας καὶ τῆς νυκτὸς μόρια ταῖς τριακοσίαις ἑξήκοντα πέντε ἡμέραις εἰς τὴν ἐκπλήρωσιν τοῦ ἐνιαυσίου χρόνου παρέδοσαν. ἀλλ' ἠγνοεῖτο τέως ὁ ἐνιαυτὸς παρὰ τοῖς Ἕλλησιν ὡς καὶ ἄλλα πλείω, ἕως οἱ νεώτεροι ἀστρολόγοι παρέλαβον ἀπὸ τῶν μεθερμηνευσάντων εἰς τὸ Ἑλληνικὸν τὰ τῶν ἱερέων ὑπομνήματα. καὶ ἔτ ινῦν παραλαμβάνουσι τὰ ἀπ' ἐκείνων, ὁμοίως καὶ τὰ τῶν Χαλδαίων**.

iv. It is asserted by Appian[k], that the Roman correction

* This testimony is very important not only to the present question but also to that of the existence of observations and records in Egypt—from which we supposed Eudoxus to have compiled his ecliptic period. Such records it seems were known to Strabo; yet as translated from the Egyptian, and as brought into Greece, by Greeks; and as still made use of by the Greek astronomers of his own time, as well as similar observations and records, obtained in like manner from the Chaldæans. And since he speaks of these astronomers of his own time as the *νεώτεροι ἀστρολόγοι*, (the later race of Grecian astronomers,) he must mean by those who first translated these documents, and first made them accessible to the Greeks, an older race—and that older race must have included Plato, Eudoxus, Callippus, more particularly.

[h] De Mensibus, ix. Uranologium, 292, D. E. [i] xvii. i.
[k] Bell. Civ. ii. 154.

of the dictator Cæsar was purposely conformed to the same kind of year among the Egyptians: *Καὶ τὸν ἐνιαυτὸν ἀνώμαλον ἔτι ὄντα διὰ τοὺς ἔσθ' ὅτε μῆνας ἐμβολίμους, (κατὰ γὰρ σελήνην αὐτοῖς ἠριθμεῖτο,) ἐς τὸν τοῦ ἡλίου δρόμον μετέβαλεν ὡς ἦγον Αἰγύπτιοι.* This correction being 19 years older than the Alexandrine, Appian cannot be supposed to have intended to say that Cæsar derived the idea of his own correction from the Alexandrine. From what type of the Julian year in Egypt then could he derive it, except some one older than the Alexandrine at least? If so, Appian, in this testimony, recognises a form of the Julian year in Egypt, older than the Alexandrine, and older than the correction of Cæsar.

It is still more plainly asserted by Dio Cassius[i] that the plan and method of the Julian correction were suggested to Cæsar by what he either observed or learnt in Egypt, B. C. 48—47; *Ἐκ τῆς ἐν Ἀλεξανδρείᾳ διατριβῆς.* In particular, the cycle of the leap-day and the leap-year; that is the very principle of the Julian correction: *Τὴν μέντοι μίαν τὴν ἐκ τῶν τεταρτημορίων συμπληρουμένην διὰ πέντε καὶ αὐτὸς ἐτῶν ἐπήγαγεν·* which implies that the Egyptians intercalated it every four years too. Dio indeed was writing his own history 273 years after the Julian correction, and 254 after the Alexandrine; but he was too well informed on these points to have been capable of falling into the absurdity of supposing Cæsar to have borrowed the plan and the details of his own correction from the Alexandrine, which was 19 years later than his. It would be gratuitous to suppose that; or to call in question either his information on these points, or his accuracy, on no better ground than mere possibility and bare suspicion.

In like manner, it is affirmed by Macrobius also that Cæsar took the idea of his own correction from the Egyptians; and that the Egyptians were always in possession of the Julian year, even while it was yet unknown to the rest of the world[k]. This is confidently asserted by Macrobius: but we do not wish to insist on *his* testimony in particular, first, because he no where bears distinct witness to the use of the equable year in Egypt, which must have been so much older even there than the Julian; and secondly, because he was writing in the reign of Theodosius the Great, 400 years

[i] xliii. 26. [k] Saturnalia, i. xiv. 268: xvi. 283. cf. i. xii. 255; xv. 271.

and more later than the date of the Alexandrine correction; by which time it might almost have been forgotten that there was ever any other form of the civil year in Egypt but that.

To these testimonies there is nothing to oppose in the shape of contrary testimony. None of the ancients has left on record a denial of the fact of the knowledge or the fact of the use of the Julian year in Egypt, in his own time and from his own knowledge. The silence of Herodotus may perhaps be alleged to the contrary. But silence is not testimony; much less contradiction. It is not pretended, in this argument of ours, that the Julian year, in any form, was ever the civil year of Egypt; or that it was known there commonly except to the priests, or used there except by them, and for purposes of their own. Herodotus has described the civil year of the Egyptians, as he observed it, *de facto*, in his own time; and he has described it correctly even as understood of the equable year: and yet it would not be difficult to shew, even from the terms of his description itself, that either he had not a true and exact idea of what he was describing, or if he had, that he must have been describing the Julian year when he seemed to be describing the equable one.

SECTION III.—*On the extant testimonies to the Sothiacal Julian year of the Egyptians in particular.*

i. *Ἐνιαυτὸν δὲ βουλόμενοι δηλῶσαι*, says Horapollo[1], *Ἶσιν τουτέστι γυναῖκα ζωγραφοῦσι, τῷ δὲ αὐτῷ καὶ τὴν θεὸν σημαίνουσιν. Ἶσις δὲ παρ' αὐτοῖς ἐστιν ἀστὴρ Αἰγυπτιστὶ καλούμενος Σῶθις Ἑλληνιστὶ δὲ ἀστροκύων, ὃς καὶ δοκεῖ βασιλεύειν τῶν λοιπῶν ἀστέρων.* If Isis was the same as the dog-star, and was also the symbol of the year; then the dog-star must have been the symbol of the year. *Ἔτι δὲ*, he continues, *καὶ διότι κατὰ τὴν τούτου τοῦ ἄστρου ἀνατολὴν σημειούμεθα περὶ πάντων τῶν ἐν τῷ ἐνιαυτῷ μελλόντων τελεῖσθαι. διόπερ οὐκ ἀλόγως τὸν ἐνιαυτὸν Ἶσιν λέγουσιν.* This must identify the beginning of the year with the first appearance of Sirius: and that would imply that the heliacal rising of this star was the beginning of some year or other in Egypt.

It was well known to Horapollo, that the Egyptians had a

[1] Lib. i. 3.

year of 365 days only. The Vulture, he tells us[m], was a type of the year, as divided into three periods of 120 days each, such as we have already explained, and five days over, which entered into none of the three, yet made up the complement of the year: *Διὰ τὸ ἐν τούτῳ τῷ ζώῳ τριακοσίας ἑξήκοντα πέντε ἡμέρας τοῦ ἔτους διαιρεῖσθαι, ἐν αἷς ὁ ἐνιαύσιος ἐκτελεῖται χρόνος. ἑκατὸν γὰρ εἴκοσιν ἡμέραις ἔγκυος μένει, καὶ τὰς ἴσας τοὺς νεοσσοὺς ἐκτρέφει· ταῖς δὲ λειπούσαις ἑκατὸν εἴκοσι τὴν ἑαυτῆς ἐπιμέλειαν ποιεῖται, μήτε κυοφοροῦσα μήτε τρέφουσα, παρασκευάζουσα δὲ ἑαυτὴν εἰς ἑτέραν σύλληψιν. τὰς δὲ λοιπὰς πέντε τοῦ ἔτους ἡμέρας ὡς ἤδη προεῖπον* (at the beginning of the chapter) *εἰς τὴν τοῦ ἀνέμου ὀχείαν καταναλίσκει.* And speaking of the symbol of *ἀφωνία*, dumbness, inability to speak, *Ἀφωνίαν δὲ γράφοντες*, says he[n], *ἀριθμὸν ᾳξε΄ γράφουσιν, ὃς τριετοῦς ἐστι χρόνου ἀριθμὸς, ἐκ τριακοσίων ἑξηκονταπέντε ἡμερῶν τοῦ ἔτους ὑπάρχοντος. ἐφ' ὃν χρόνον μὴ λαλῆσαν τὸ παιδίον σημειοῦται ὡς παραπεποδισμένον τῇ γλώσσῃ.*

But that notwithstanding this he recognises a year equivalent to four of these, and the same with the Julian *τετραετηρὶς* or cycle of leap-year, appears from the following passages. i. *Ἄνθρωπον ζήσαντα τέλειον βίον θέλοντες δηλῶσαι κορώνην ἀποθανοῦσαν ζωγραφοῦσιν· αὕτη γὰρ ζῇ ἑκατὸν ἔτη κατ' Αἰγυπτίους. τὸ δὲ ἔτος κατ' Αἰγυπτίους τεσσάρων ἐνιαυτῶν*[o]. ii. *Ἔτος τὸ ἐνιστάμενον γράφοντες τέταρτον ἀρούρας γράφουσιν. ἔστι δὲ μέτρον γῆς ἡ ἄρουρα πηχῶν ἑκατόν. βουλόμενοί τε τὸ ἔτος εἰπεῖν τέταρτον λέγουσιν. ἐπειδὴ, φασὶ, κατὰ τὴν ἀνατολὴν τοῦ ἄστρου τῆς Σώθεως* (Isis) *μέχρι τῆς ἄλλης ἀνατολῆς τέταρτον ἡμέρας προστίθεσθαι, ὡς εἶναι τὸ ἔτος τοῦ θεοῦ τριακοσίων ἑξήκοντα ἡμερῶν* (supple *καὶ τετάρτου·*) *ὅθεν καὶ διὰ τετραετηρίδος περισσὴν ἡμέραν ἀριθμοῦσιν Αἰγύπτιοι. τὰ δὲ τέσσαρα τέταρτα ἡμέραν ἀπαρτίζει*[p]. On this principle, the Egyptians must have had a proper cycle of leap year, attached to the heliacal rising of Sirius, in which one day was intercalated every four years*.

* According to Suidas, Horapollo was a native of a village in the Panopolite Nome; a son of Phænebytheus a grammarian; and a contemporary of the reign of Theodosius, in which he taught grammar at Alexandria. Horapollo the grammarian, author of a work *περὶ τῶν πατρίων Ἀλεξανδρείας*, is mentioned in Photius' account of the compilation of Helladius: Codex, 279. p. 536, l. 15. The name of Phænebytheus, as

m Lib. i. 11. p. 20. n i. 28. o ii. 89. p i. 5.

ii. Porphyry, De Nympharum Antro[q]: *Τῶν δύο πυλῶν τούτων μεμνῆσθαι καὶ Παρμενίδην ἐν τῷ Φυσικῷ φασι* (Numenius sc. and Cronius) *Ῥωμαίους τε καὶ Αἰγυπτίους. Ῥωμαίους γὰρ τὰ Κρόνια ἑορτάζειν ἡλίου κατ' Αἰγόκερων γενομένου....Αἰγυπτίοις δὲ ἀρχὴ ἔτους οὐχ Ὑδροχόος, ὡς Ῥωμαίοις, ἀλλὰ Κάρκινος· πρὸς γὰρ τῷ Καρκίνῳ ἡ Σῶθις ἣν Κυνὸς ἀστέρα Ἕλληνές φασι. νουμηνία δ' αὐτοῖς ἡ Σώθεως ἀνατολὴ, γενέσεως κατάρχουσα τῆς εἰς τὸν κόσμον*[r]. This testimony is much to the point. It would be absurd to suppose that Porphyry was alluding here to the beginning of the year according to the Alexandrine calendar, August 30 or 29, 40 or 41 days later than the stated date of the heliacal rising of Sirius in his time, July 20 or 21. It is no objection that he designates it as the *νουμηνία*: even though the new years' day of a solar not of a lunar calendar must have been meant thereby. This is the common idiom, later than the transition of the old lunar calendar of the Greeks into the solar and Julian. Porphyry therefore knew of a Julian year

that of the father of Horapollo, is perhaps to be suspected; Phenebethis being the name of the native village of Horapollo himself: Steph. Byz. *Φενέβηθις: πόλις Αἰγύπτου . . . καὶ Φενεβηθίτης, οὕτω γὰρ Ὡραπόλλων ὁ φιλόσοφος ἐχρηματίζετο.*

The title of the hieroglyphica is *Ὡραπόλλωνος, Νειλῴου, ἱερογλυφικὰ, ἃ ἐξήνεγκε μὲν αὐτὸς Αἰγυπτίᾳ φωνῇ, μετέφρασε δὲ Φίλιππος εἰς τὴν Ἑλλάδα διάλεκτον.* There are many Latin words in the Greek of this version; which imply that it must have been made in the decline of the Greek language. Suidas makes no mention of the Hieroglyphica among the works of *his* Horapollo: and besides represents him as the native of a *κώμη* in Egypt merely; whereas the author of the Hieroglyphica was represented by his translator as Νειλῷος, which we understand to mean a native of Nilopolis, the city of the Nile; which in the native Egyptian was probably called simply the city of Hapimooü or the Nile. Horapollo was likely to be a very common name among the Egyptians. We are altogether of opinion that Suidas' Horapollo, and the author of the Hieroglyphica, were different persons: and that consequently the age of the former is no proof of that of the latter. Concerning this in particular all we can say is, that his name, compounded of the Egyptian Ὧρος and of the Greek Ἀπόλλων, would imply that he could not be older than the time when the Greek Ἀπόλλων came to be familiarly known in Egypt, and to be considered the same as the Egyptian Ὧρος: and that may make him later than the commencement of the reign of the Ptolemies in Egypt, but it may also make him older; for there can be no doubt that the Greek mythology was more or less familiar to the Egyptians long before the time of the Ptolemies.

[q] Cap. xxiii. [r] xxiv.

in Egypt attached to the heliacal rising of Sirius: and there is no reason why he should not have done so, seeing it was almost 1600 years old in his time; and all mystery concerning it, which might once have existed, had long ceased. Observe too how he virtually dates even the natale mundi on this *νουμηνία* of Sothis, in the words *γενέσεως κατάρχουσα τῆς εἰς τὸν κόσμον.* That was eminently an Egyptian doctrine, from the time of the introduction of this year; but not, so far as we know, before. Solinus was a contemporary of Porphyry's: and he too dates the natale mundi on the three days which he assigns to the rising, July 20–22.

iii. In like manner, the Scholia on the phænomena of Aratus recognise the same natural phenomenon as the stated beginning of the year also[s]: Τότε γὰρ, (with the ingress of the sun into Leo,) *ἐκβαίνει ὁ* Νεῖλος, *καὶ ἡ τοῦ* Κυνὸς *ἐπιτολὴ κατὰ ἐνδεκάτην ὥραν φαίνεται. καὶ ταύτην* (sc. *τὴν ἐπιτολὴν*) *ἀρχὴν ἔτους τίθενται, καὶ τῆς* Ἴσιδος *ἱερὸν εἶναι τὸν* Κύνα *λέγουσι καὶ τὴν ἐπιτολὴν αὐτοῦ.*

iv. To these testimonies we may add also that of Vettius Valens, an unedited writer on astrology, whose work has repeatedly been quoted, but has never yet been published. This author is often represented as a contemporary of Adrian's: yet we have found dates in him as late as the reign of Valentinian, and two even in terms of the æra of Diocletian, 116, and 117, which, if genuine, would make him as late as A. D. 400: and but for these dates we should have been entirely of the opinion of Scaliger[t], that he was the same Vettius Valens, of Antioch, and an astrologer, like him, who was contemporary with the foundation of Constantinople, A. D. 330, and was said to have cast its nativity, and to have predicted that it would last 696 years and no longer.

The title of this work is *Οὐεττίου Οὐάλεντος Ἀντιοχέως Ἀνθολογιῶν κ̀, τ. λ.* And it extends to ten books at least; of which, in the MS. which we consulted, the third was imperfect, but owing apparently to a defect in the MS. itself. It is dedicated to a certain Marcus: *Οὐάλης Μάρκῳ χαίρειν*[u]— *Καὶ ταῦτα μὲν ὦ Μάρκε μετὰ πολλοῦ πόνου καὶ ἐγκρατείας ζητήσας καὶ ἀνευρὼν συνέταξα…τοιγαροῦν ὁρκίζω σε τὸν θ κ,* ☾ *(ἥλιον καὶ*

s Ad ver. 152. t De Emendatione, v. 509. B.
u Lib. ix. p. 153, Procem.

σελήνην) κ᾽, τ. λ.[w]: apparently too his brother; unless he meant merely a brother of the craft: *Ὁρκίζω σε ἀδελφέ μου τιμιώτατε, καὶ τοὺς μυσταγωγούς μου ἐν ταύτῃ τῇ συντάξει, οὐρανοῦ μὲν ἀστήρικτον* (forsan *ἀστρόστικτον*) *κύτος κ,τ.λ.*[x] And he speaks of his knowledge as acquired only at much pains and much expense, chiefly in Egypt, where he had to purchase it from covetous masters: *Ἡμεῖς δὲ πολλὴν μὲν χώραν διοδεύσαντες καὶ τὴν Αἴγυπτον διελθόντες, διδασκάλοις φιλαργύροις περιπεσόντες, τὰς μὲν τῶν χρημάτων δόσεις ἐποιησάμεθα, διὰ τὴν περὶ τὸ ὀρθὸν* (corrige *σοφὸν*) *ἐπιθυμίαν*[y] *κ᾽, τ. λ.*

To produce however some of the testimonies to the present question, contained in his work.

i. *Καθολικῶς οὖν τοῦ ἔτους* (supple *τὸ*) *κύριον καὶ κοσμικῶν κινήσεων οἱ παλαιοὶ ἐκ τῆς νεομηνίας τοῦ Θὼθ κατελάβοντο· ἔνθεν γὰρ τὴν ἀρχὴν τοῦ ἔτους ἐποιήσαντο· φυσικώτερον δὲ καὶ* (*ἀπὸ*) *Κυνὸς ἐπιτολῆς*[z]. The first of Thoth here meant is the Alexandrine; so at least may we infer from an allusion, not long before[a], to Mecheir 13 *Κατὰ Ἀλεξανδρεῖς*. No beginning of the civil year indeed, attached to the rising of Sirius, can be said to be necessarily implied in these words: only that it would be more natural to derive the proper epoch of the *κινήσεις κοσμικαὶ* from this star, than from the first of Thoth.

ii. *Φυσικώτερον δὲ καὶ ἀπὸ τῶν κέντρων δεῖ ἐκβαίνειν. καθάπερ γὰρ καὶ ἐπὶ τῶν καθολικῶν καὶ κοσμικῶν εὑρίσκεται τὸ ὅμοιον καὶ ἐπὶ τῶν ἀνθρώπων. ἐκ γὰρ τῆς τοῦ Κυνὸς ἐπιτολῆς τὸ ἔτος καὶ τὰ δ΄ κέντρα ἀνακυκλεῖται διὰ τῆς τετραετηρίδος. πλὴν ἐν διαφόροις οἱ ἐνιαυτοὶ γίνονται, παρὰ τὰς τῶν ἄστρων σχηματογραφίας καὶ φάσεις καὶ τὰς κατὰ καιρὸν ἐπεμβάσεις*[b]. This testimony recognises a tetraëteris, or cycle of four years, in which the cardinal points, having set out from the *Κυνὸς ἐπιτολὴ*, and four times changed their positions relatively to the stars, returned to the same relations both to it and to them.

iii. *Εἰ οὖν ταῦτα οὕτως ἔχει, ἀναγκαῖον καὶ ἐπὶ τῶν γενέσεων τὰ δ΄ κέντρα σχηματίζειν. ...δεῖ δὲ καὶ τὴν κοσμικὴν σύνοδον προγινώσκειν, καὶ τὴν τοῦ Κυνὸς ἐπιτολὴν .... καὶ τὸν τῆς τοῦ Κυνὸς ἐπιτολῆς κύριον. οὗτος γὰρ καθολικῶς ὁ τοῦ ἔτους οἰκοδεσπότης*

w vii. p. 138 ad calcem.

x iv. p. 69.

y iv. p. 69. *Περὶ ἐνιαυτοῦ χρηματιστικοῦ.*

z i. p. 2 reverse.

a i. p. 2 ad princip.

b iv. p. 71. *Περὶ ἐνιαυτοῦ χρηματιστικοῦ.*

κριθήσεται· κυκλικοὶ δὲ οἱ τῶν τόπων κύριοι. ὁμοίως δὲ καὶ ἐπὶ ἑκάστης γενέσεως καὶ ἀντιγενέσεως· καὶ καθολικὸς μὲν ὁ τοῦ ἔτους κύριος, κυκλικὸς δὲ ὁ τῶν συνόδων ἢ πανσελήνων[k]. The meaning of this passage is generally the same as that of the preceding, so far at least as to imply that in all calculations of this kind the rising of Sirius was to be regarded as the proper beginning of the year. On which principle, a year of some kind, dated perpetually from this natural term, would be recognised by it; and this year a comparison with the preceding statements would shew to be one which had a cycle of four years, the cycle of its proper restitution; and therefore to be a Julian year strictly so called, yet dated from the rising of Sirius.

Lastly, it appeared from Strabo that Eudoxus and Plato were generally believed to have brought with them into Greece, from Egypt, the knowledge of the mean Julian year, which they had learnt there from the priests; and in all probability too an implicit conviction and belief that it was altogether the same with the mean natural. We consider this fact to be unquestionable, so far as concerns Eudoxus; but we reserve the proof of it for a future opportunity, if that should ever arrive. With regard to Plato, we propose to put the truth or the falsehood of the same belief to the test by briefly considering the nature of the year which he appears to have prescribed for the use of his Πολιτεία or republic.

SECTION IV.—*On the nature of the year prescribed in the republic of Plato; and on its agreement with the Sothiacal one of the Egyptians.*

Now though the nature of this year is no where formally stated in his Politia, or in his work De Legibus; yet an idea of it may be obtained from the latter of these works, by comparing a number of intimations, relating to it, or to the annual and menstrual reckoning of time in this republic of Plato's, one with another.

i. With respect to the length of the months in this year, it appears to have been assumed at 30 days: Ἐὰν δέ τις δημοσίαν ἀρχὴν ἄρχων ἀποθάνῃ πρὶν ἐξήκειν αὐτῷ τὴν ἀρχὴν πλεῖον ἢ τριάκοντα ἡμερῶν[l], κ', τ. λ.; that is, as it may reasonably be pre-

[k] iv. p. 71 ad calcem. [l] Opp. iii. 11: De Legibus, vi. 441. 8.

sumed, more than *one* month. Thirty days are mentioned in another passage in the sense of a month[m]. Now 30 was the stated length of the solar month in the equable calendar of antiquity, and in the Sothiacal calendar also. The lunar months of the Greek calendar, it is true, from the time of Solon downwards, were nominally each 30 days long; and those of the Metonic calendar were the same too. But that Plato did not mean lunar months by these menstrual cycles of 30 days each may be collected from the following passage[n]: Νόμος δὲ ἔστω μηνὸς τῇ νέᾳ ὧν δεῖ πραθῆναι τὸ μέρος τοῖς ξένοις ἐξάγειν τοὺς ἐπιτρόπους...δωδεκατημόριον πρῶτον τοῦ σίτου, τὸν δὲ ξένον εἰς πάντα τὸν μῆνα ὠνεῖσθαι σῖτον...ἀγορᾷ τῇ πρώτῃ... δωδεκάτῃ δὲ τοῦ μηνὸς τὴν τῶν ὑγρῶν οἱ μὲν πρᾶσιν οἱ δὲ ὠνὴν ποιείσθωσαν δι' ὅλου τοῦ μηνὸς ἱκανήν· τρίτῃ δὲ εἰκάδι τῶν ζώων ἔστω πρᾶσις, κ', τ. λ.

Now though the rule of these ἀγοραὶ on the 1st, the 12th, and the 23d of every month might be supposed to have been suggested by that of the κύριαι ἐκκλησίαι at Athens, they are not called here ἐκκλησίαι but ἀγοραί; that is, markets: and the dates of these ἀγοραὶ or markets are not attached to the same days of the month as those of the κύριαι ἐκκλησίαι, which appear to have been the 11th, the 21st, and the τριακάδες or 30th of every month*. The first of these ἀγοραὶ too is attached to the first of the month; but we do not know that the first of the month was a stated market day at Athens, except for buying and selling slaves†. It is observ-

* Ulpian, p. 138, (ex editione Dobson, Londini, 1828,) Scholia in Demosth. De Falsa Legatione, 253: Σύγκλητος ἐκκλησία] Τρεῖς ἐκκλησίαι τοῦ μηνὸς ἐγίνοντο ὡρισμέναι. Cf. Scholia Augustea of Reiske, 378. 26—Pag. 176. Adv. Leptinem, 468, 6: Τοῦτον δ' ἐν ταῖς ἐκκλησίαις] Τρεῖς δὲ ἐγίνοντο ἑκάστου μηνὸς ἐκκλησίαι—261. Contra Timocratem, p. 278, 12: Ἐν τῇ πρώτῃ δὲ πρυτανείᾳ] Ἰστέον γὰρ ὅτι κατὰ μῆνα τρεῖς ἐκκλησίας ἐποιοῦντο . . . καὶ ἐγένετο ἡ πρώτη ἐνδεκάτῃ τοῦ μηνὸς, ἡ δὲ δευτέρα περὶ τὴν εἰκοστὴν, ἡ δὲ τρίτη περὶ τὴν τριακοστήν. The Scholia on the Acharnenses of Aristophanes, verse 19, date them on the first, the tenth, and the thirtieth. Cf. Harpocratio, Κυρία ἐκκλησία: σύγκλητος ἐκκλησία. Photii Lexicon, Κυρία ἐκκλησία: σύγκλητος ἐκκλησία. Appendix ad Photium, Κυρία ἡ ἐκκλησία. Etymolog. M. Κυρία: σύγκλητοι.

† Scholia ad Aristoph. Equites 43: Τῇ προτέρᾳ νουμηνίᾳ . . ἐν δὲ ταῖς νου-

m Opp. iii. iii: ii. 234. 16.

n Opp. pars iii. vol. iii. 115. (=849.) 5. De Legibus, viii.

able of the first of these markets here, that it was to be held for the buying and selling of corn, (bread corn,) *σῖτον*; and the only one which was to be held for that purpose during the month: and people were to buy at that one market on the first of the month as much corn as they should want for the whole of the month—that is, for 30 days. For these markets were evidently to be held 11 days asunder, three in every month, and each 30 days distant from the next of the same kind in the next month. But it is most important to remark, with respect to the question whether these months were lunar or solar, that, specifying the first day of one of these months, Plato does not say *τῇ νουμηνίᾳ*, but *μηνὸς τῇ νέᾳ* with the ellipsis of *ἡμέρᾳ*. The former must properly have been understood of the first day of a lunar month; the latter is not necessarily so to be understood. It was not without a reason of some kind that Plato substituted for the common designation of the first of the month in his time, *τῇ νουμηνίᾳ*, this uncommon one of *μηνὸς τῇ νέᾳ*: and no reason is so probable as that he did it on purpose to avoid ambiguity and misconstruction; lest the first day of the month should be mistaken for the first day of the moon.

It is not less remarkable that he specifies the date of the third of his markets, the 23rd of the month, by *τρίτῃ δὲ εἰκάδι*, and not in the usual style of the lunar calendar of his time for the same day of the lunar month; which would have been *τῇ δὲ ὀγδόῃ φθίνοντος*. *Τρίτῃ δὲ εἰκάδι* is just the same thing in Greek, as our own phrase in English, *on the 23rd of the month*; which no one would think of referring to the lunar month. It cannot indeed be denied that we do meet with this mode of speaking even of the days of the last decad of the lunar month*: but it is not less certain that

μηνίαις οἱ δοῦλοι ἐπωλοῦντο, καὶ οἱ στρατηγοὶ ἐχειροτονοῦντο—Ad Vespas, 96: Νουμηνία: *κατὰ νουμηνίαν γὰρ ἔθος εἶχον λιβανωτοὺς ἐπιτιθέναι τοῖς ἀγάλμασι*—171: *Νουμηνία γάρ ἐστιν. ἔθος ἦν Ἀθήνῃσιν ἐν νουμηνίᾳ πιπράσκειν*—Alciphron, Epp. iii. xxxviii. Εὔδικος Πασίωνι: *Φρύγα οἰκέτην ἔχω πονηρόν· ὃς ἀπέβη τοιοῦτος ἐπὶ τῶν ἀγρῶν. ὡς γὰρ τῇ ἕνῃ καὶ νέᾳ κατ᾽ ἐκλογὴν τοῦτον ἐπριάμην Νουμήνιον μὲν εὐθὺς ἐθέμην καλεῖσθαι*—iii. LXI. *Πατρὸς μὲν ἀσήμου μητρὸς δὲ βαρβάρης, Σκυθίδος δὲ οἶμαι ἢ Κολχίδος ἐν νεομηνίᾳ ἐωνημένης.* Cf. Suidas, Νουμηνία.

* Hesiod (Opp. et Dies, 818. 821) calls the 21st of the month *μετείκαδα*; and applies the name of *μετάδουποι* (or *μεταδούπιοι*) in general to all the

such instances are rare of occurrence, and that they are exceptions to the usual rule. Plato in particular was too careful about his language, and too attentive to propriety, not to have acted on purpose, if he varied the usual expression for the 23d of the month, in this instance; viz. that the 23rd of a solar might not be mistaken for the 23rd of a lunar month.

days of the month after the twentieth, except the 21st, the 27th, the 29th, and the 30th; and the calendar was lunar in his time. In Aristophanes (Nubes, 16) we find

Ἐγὼ δ' ἀπόλλυμαι
ὁρῶν ἄγουσαν τὴν σελήνην εἰκάδας—

that is, the days of the month after the *εἰκάδα* or twentieth, the last decad of the month; the *τριακὰς*, or *ἕνη καὶ νέα*, the last of all, being that when the payment of debts became due. The Scholiast observes on this passage, Οἱ Ἀττικοὶ δὲ τὰς εἰκάδας πληθυντικῶς λέγουσι, meaning these ten days in the complex:

Ἐμὲ γὰρ διέτριψεν ὁ
κομψότατος ἀνδρῶν Χαιρεφῶν ἱερὸν γάμον
φάσκων ποιήσειν δευτέραν μετ' εἰκάδα
καθ' αὑτὸν, ἵνα τῇ τετράδι δειπνῇ παρ' ἑτέροις.
τὰ τῆς θεοῦ γὰρ πανταχῶς ἔχειν καλῶς.

Menander, apud Athenæum, vi. 42. in the Μέθη.

Demosthenes, (xviii. 147. De Corona,) Psephisma Pseudeponymum: Ἄρχων Δημόνικος Φλυεὺς, Βοηδρομιῶνος ἕκτῃ μετ' εἰκάδα. Inscriptiones Græcæ, pars ii. 149, 150. No. 108: Ἐπὶ Ἐργοκλέους ἄρχοντος ἐν ἄστει ἐν Σαλαμῖνι δὲ Ἀνδρῶνος, Μεταγειτνιῶνος τετράδι μετ' εἰκάδας: the date of which is not known, only that it must have been later than B. C. 285, where the list of archons begins to fail. Ibid. ii. 20. pars viii. No. 1845. l. 1: Ἐπὶ σωτηρίαι πρυτανεύοντος Ἀριστομένεος μηνὸς Μαχάνεος τεταρτῃ ἐπὶ εἰκάδι, κ', τ. λ.: an inscription of Corcyra, of great antiquity.

Etymologicum Magnum, Ἀποφράδες: (cf. Phavorini Lexicon in voce:) Ἀποφράδας ἔλεγον οἱ Ἀττικοὶ τὰς ἀπηγορευμένας ἡμέρας ἃς ὑπελάμβανον χείρους εἶναι τῶν ἄλλων· ἃς δὴ καὶ ἐπεικάδας καλοῦσι, φθίνοντος τοῦ μηνὸς τετράδα, τρίτην, δευτέραν. Pollux, Onomasticon, i. vii. 5. § 63: Καὶ μέχρι τῆς εἰκοσάδος· τὸ δὲ ἀπὸ τούτου α' ἐπὶ εἰκάδι· ἡ δ' αὐτὴ καὶ θ' φθίνοντος. θ' γὰρ λοιπὰ ἀπὸ τῆς κα'. Eustathius, ad Dionysium Periegetem, 803: Ἱστορεῖ δὲ ὁ αὐτὸς (ὁ Ἀρριανὸς) ὅτι τοῖς Χαλκηδονίοις ἀποφρὰς νομίζεται παντὸς μηνὸς φθίνοντος ἐνάτη, ἤγουν, ὡς τοῖς Ἀττικοῖς ἀρέσκει, αἱ εἰκοσταὶ πρῶται τῶν ὅλων μηνῶν. Ælian, Variæ Historiæ, iii. 23: De Alexandri Morte: *τετράδι μετὰ εἰκάδα: εἶτα τῇ τρίτῃ (μετὰ εἰκάδα).*

Some of these dates are probably meant of the solar month; but others must be intended of the lunar. They are however, as the reader will observe, few, and exceptions to the general idiom and mode of speaking of such dates in the classical Greek writers, contemporary with the lunar calendar.

ii. With regard to the number of the months in his year, a lunar year, at times, must contain thirteen months: Plato's year appears to have been intended never to consist of more than twelve. We may infer this, because he gives us to understand that the twelfth month was called after Pluto: Ἔτι δὲ καὶ τὸ τῶν χθονίων, καὶ ὅσους αὖ θεοὺς οὐρανίους ἐπονομαστέον καὶ τὸ τῶν τούτοις ἑπομένων, οὐ ξυμμικτέον ἀλλὰ χωριστέον· ἐν τῷ τοῦ Πλουτῶνος μηνὶ τῷ δωδεκάτῳ κατὰ τὸν νόμον ἀποδιδόντας[o]. We apprehend that if the twelfth month was sacred to Pluto, and bore his name, each of the months before this was sacred to some one god or other, and bore his name too: and the Dii Majores of the Greeks being twelve in number, each of them on this principle would have one month of the calendar of Plato to himself; only the eleven gods of Olympus would have the first eleven months, and Pluto, the god of the lower world, would have the twelfth. The Scholiast understood this twelfth month of his calendar, dedicated to Pluto, as the last; for he observes of it, Ὁ Σκιρροφοριὼν οὗτος: for Skirrhophorion was notoriously the twelfth and last month of the Attic calendar of Plato's time. In assigning this last month to Pluto, that is to the Dii Manes or Inferi, and to the ceremonies proper for those gods, Plato was probably actuated by the same sense of propriety as Numa, when he assigned his February to the same gods and to the same ceremonies. The ἡμέραι ἀποφράδες of his year are recognised as stated days[p]. In imitation too of this rule of the calendar of the Politia, in calling each of its months after some one or other of the gods, it is probable that Lucian in his Vera Historia[q] supposes the calendar of the Fortunate Islands to have one of its months called after Minos, the month Minoüs: which implies that the rest were similarly denominated. And he might purposely intend all this as a satire on the calendar of Plato.

iii. It may be inferred that the year of Plato could not have contained less than 365 days. i. Ἀρχὴ δὲ ἔστω τῶν μετὰ ταῦτα ἡμῖν νόμων ἥδέ τις, ἀφ' ἱερῶν ἠργμένη...12 Ἑκάστην δὴ τὴν μοῖραν διανοεῖσθαι χρεὼν ὡς οὖσαν ἱερὸν θεοῦ δῶρον ἑπομένην τοῖς

[o] Opp. Pars iii. vol. iii. p. 75 (=828) 10. De Legg. viii.

[p] Ibid. 26. (=800) 9–19. Lib. vii.

[q] Opp. ii. 112: l. 24. Vera Historia, ii. 13.

μησὶ καὶ τῇ τοῦ παντὸς περιόδῳ[r]. These μοῖραι are virtually meant of degrees of the ecliptic, or of so much of that circle in space as the sun must be supposed to move through every day. The same passage prescribes two ξύνοδοι—convocations, or assemblies, every month, θυσιῶν πέρι—Θυσιῶν πέρι, ξυνόδους ἐπ' αὐταῖς ποιούμεθα δὶς τοῦ μηνός[s]. ii. The number of these θυσίαι was not to be less than 365 every year; i. e. not less than one a day: Τὸν ἀριθμὸν δὴ λέγωμεν πρῶτον. ἔστωσαν γὰρ τῶν μὲν πέντε καὶ ἑξήκοντα καὶ τριακοσίων μηδὲν ἀπολείπουσαι, ὅπως ἂν μία γέ τις ἀρχὴ θύῃ θεῶν ἢ δαιμόνων τινὶ ἀεὶ ὑπὲρ πόλεώς τε καὶ αὐτῶν καὶ κτημάτων[t]. And this implies that his official year must have contained 365 days at least; or else how could some one sacrifice have been made by some one in office every day?

iv. The beginning of his year was fixed to the same season of the natural year; and that season, midsummer; at or about the summer solstice at least. We infer this from the rule which he lays down for the election of three persons every year, first of all, who were to be called Ἱερεῖς; and then of twelve others, to be designated Εὔθυνοι[u]: Τεκταινώμεθα δή τινα τρόπον αὐτῶν τοιάνδε γένεσιν. κατ' ἐνιαυτὸν ἕκαστον μετὰ τροπὰς ἡλίου τὰς ἐκ θέρους εἰς χειμῶνα ξυνιέναι χρεὼν πᾶσαν τὴν πόλιν εἰς Ἡλίου κοινὸν καὶ Ἀπόλλωνος τέμενος... 290. 6: τούτους δὲ πρώτῳ μὲν ἐνιαυτῷ δώδεκα εὐθύνους ἀποδεῖξαι κ. τ. λ. ... 9 where, in the number of these Εὔθυνοι, there is clearly a reference to the number of months in the year. And their official year beginning at or after the solstice in one year would last to the same time in the next.

It is further prescribed with reference to the three Ἱερεῖς that one of them should be styled Ἀρχιερεὺς, and be the ἱερεὺς ἐπώνυμος or ordinarius, who should give his name to the year and seal the Fasti[v]: Ἀρχιερέα δὲ ἕνα κατ' ἐνιαυτὸν (εἶναι) τὸν πρῶτον κριθέντα τῶν γενομένων ἐκείνῳ τῷ ἐνιαυτῷ τῶν ἱερέων, καὶ τοὔνομα ἀναγράφειν τούτου κατ' ἐνιαυτὸν, ὅπως ἂν

r De Legibus, vi. Opp. Pars iii. vol. ii. 450, (=726) 5.

s Ibid. 451. 5.

t Lib. viii. Ibid. 75 (=828) 8.

u De Legg. xii. Opp. Pars iii. vol. iii. 289 (=945) 4. These Εὔθυνοι would answer to the Λογισταὶ at Athens, whose duty it was to audit the accounts τῶν διῳκημένων, within 30 days after the expiration of the official year. Only at Athens these were ten in number, not twelve. Cf. Harpocration, Λογισταὶ καὶ λογιστήρια. Photius, Λέξεων συναγωγή· Λογισταὶ καὶ λογιστήρια. Suidas, Λογισταὶ καὶ λογιστήρια.

v Ibid. 291. 12.

γίγνηται μέτρον ἀριθμοῦ τοῦ χρόνου ἕως ἂν ἡ πόλις οἰκῆται. These same *ἱερεῖς* alone too were to have the privilege of wearing a chaplet of laurel during their year of office[x]: *Καὶ τούτους μόνους δάφνης στεφάνῳ τῶν ἐν τῇ πόλει κεκοσμημένους εἶναι.*

This passage then is decisive that the civil year of Plato was dated in the summer; *after*, but not *before*, the solstice: for the year of his *ἱερεὺς ἐπώνυμος* was evidently to be dated from his election, and that was to take place after, not before, the solstice. There is another allusion to the solstitial month, where he is speaking of suits at law; and of the limits of time within which they were to be decided for different descriptions of persons[y]: *Δίκαι δ' ἔστωσαν ... εἰς μὲν πολίτην ἢ καὶ μέτοικον τῶν ἐν τῇ πόλει ἡμερῶν τριάκοντα, εἰς δὲ ξενικὴν παράδοσιν πέντε μηνῶν, ἧς μέσος ὁ μὴν ἐν ᾧ τρέπεται θερινὸς ἥλιος εἰς τὰ χειμερινά.* This implies that strangers from abroad (from beyond seas) might be expected to arrive about a month after the vernal equinox, and not to stay longer than the autumnal: five months in all, of which the solstitial month, June 27—July 27, would be the third.

It appears then that the year of the Republic of Plato was solar, not lunar; that it consisted of 12 months of 30 days each, yet of not less than 365 days. Consequently it must have had five epagomenæ. It appears too that it was fixed to the same season of the natural year; that it was always to begin at midsummer, yet *after*, not *before*, the solstice itself. But how was this possible, if it was never to consist of more than 365 days? Can it be supposed that Plato imagined 365 days to be the true length of the natural year? or that he knew less about the natural year than Meton and Euctemon, whose calendar had been made public so long before his time? or than Eudoxus his scholar, or Callippus after Eudoxus? each of whom assumed the mean length of the natural year as the same with the mean Julian. Was his year then really to contain only 365 days, 12 months, and five epagomenæ, or occasionally also 366, 12 months, and six epagomenæ? It is very significant in answer to this

x Ibid. 291. 10. Artemidorus, Oneirocritica, i. 18: the *ἀρχαὶ* of antiquity all wore some insigne about the head, a *στέφανος*, a *στρόφιον*, a *διάδημα*. But this privilege of wearing a crown of laurel at Athens was restricted to certain official persons. The archons at Athens wore a chaplet of myrtle.

y Lib. xi. Opp. Pars iii. vol. iii. 234. (=915) 21—235. 9.

question, that he prescribed, as we saw, not *less* than 365 sacrifices every year. For why not *less* than 365 in every year, if in some years there were not to be *more?* We conclude then that the tradition of antiquity is true, which supposes him to have become acquainted with the Julian year; and most probably in Egypt: and that this is in reality the kind of year which he prescribes for his republic, though he does not say so in so many words, but leaves it to implication only. In so doing however, he was merely imitating the reserve of his Egyptian masters. Every one must admit that if we only suppose him to have had his eye fixed all along, in the above directions relating to his calendar, on such a term as July 21 or 20, the proper Julian date of the Sothiacal calendar in Egypt; it will throw wonderful light on his allusions. It should not however be forgotten that the Athenians themselves had once a Julian calendar among them, as old as the time of Erichthonius; and attached to the same date, July 21 or 20. Plato was probably aware of that, whether others of his contemporaries were so or not: and he would see that, between that year itself and the Sothiacal year of the Egyptians, there was originally no difference; and that to imitate and to adopt either in the calendar of his republic was to imitate and to adopt the other. On this point however our readers must judge for themselves.

CHAPTER III.

On the Julian year and the Metonic calendar of Egyptian Thebes.

SECTION I.—*Testimonies of Diodorus Siculus and Strabo.*

i. *Οἱ δὲ Θηβαῖοί φασιν ἑαυτοὺς ἀρχαιοτάτους εἶναι πάντων τῶν ἀνθρώπων, καὶ παρ᾽ ἑαυτοῖς πρώτοις φιλοσοφίαν τε εὑρῆσθαι καὶ τὴν εἰς ἀκριβὲς ἀστρολογίαν, ἅμα καὶ τῆς χώρας αὐτοῖς συνεργούσης πρὸς τὸ τηλαυγέστερον ὁρᾷν τὰς ἐπιτολάς τε καὶ δύσεις τῶν ἄστρων· ἰδίως δὲ καὶ τὰ περὶ τοὺς μῆνας αὐτοῖς καὶ τοὺς ἐνιαυτοὺς διατετάχθαι. τὰς γὰρ ἡμέρας οὐκ ἄγουσι κατὰ σελήνην ἀλλὰ κατὰ τὸν ἥλιον, τριακονθημέρους μὲν τιθέμενοι τοὺς μῆνας, πέντε δ᾽*

ἡμέρας καὶ τέταρτον τοῖς δώδεκα μησὶν ἐπάγουσι, καὶ τούτῳ τῷ τρόπῳ τὸν ἐνιαύσιον κύκλον ἀναπληροῦσιν. ἐμβολίμους δὲ μῆνας οὐκ ἄγουσιν οὐδ' ἡμέρας ὑφαιροῦσι καθάπερ οἱ πλεῖστοι τῶν Ἑλλήνων. περὶ δὲ τῶν ἐκλείψεων ἡλίου τε καὶ σελήνης ἀκριβῶς ἐπεσκέφθαι δοκοῦσι, καὶ προρρήσεις περὶ τούτων ποιοῦνται, πάντα τὰ κατὰ μέρος προλέγοντες ἀδιαπτώτως [z].

Diodorus was a native of Argyrium in Sicily [a]. He tells us also himself he was thirty years employed on the composition of his history [a]; in the course of which time he visited great part of the Roman empire, (in fact of the ancient *οἰκουμένη*,) in order to collect his materials on the spot. When he made the statement just produced, his work was finished but not yet published [a]. He speaks of the celebrated Mithridates, Ὁ *πρὸς Ῥωμαίους διαπολεμήσας*, as a contemporary of his own [b]: so that he must have been living before B. C. 63. He survived the death of Julius Cæsar, U. C. 710, B. C. 44; whom he more than once styles *Καῖσαρ ὁ θεός* [c]. He mentions the plantation of a Roman colony at Tauromenium in Sicily, in the reign of "Cæsar [d]," i. e. of Augustus, still reigning at that time: and one of his fragments [e], if genuine, would imply that he was living towards even the end of the reign of Augustus. But this is no necessary inference from his words. The proper term however which he appears to have proposed for the close of his history was the end of Julius Cæsar's wars in Gaul; which he dates 730 years after the first Olympiad, (B. C. 776,) i. e. B. C. 46 [f]: and to various events of which he alludes by the way in different passages of his extant books [g]; as the siege of Alesia [h], the bridge over the Rhine [i], and the invasion of Britain [k]. The entire work consisted of 40 books [l]; comprehending 1138 years reckoned from the date of Troja Capta; for which he followed Apollodorus [l], who dated that event B. C. 1184.

With regard to his visit to Egypt; he tells us [m] he was there Olymp. 180, in the reign of Ptolemy Auletes, surnamed Ὁ *νέος Διόνυσος*, the father of Cleopatra: and this date corresponds to B. C. 60–59; fourteen or fifteen years before the

z Diodorus Sic. i. 50; cf. 49.
a i. 4. b xiv. 31.
c iv. 19: v. 21. 25; cf. xvi. 70; Fragm. xxxiii. d xvi. 7.
e xxxvii. (Eclogæ, ii. p. 541 sq.)
f i. 4, 5; cf. Photius, Bibliotheca, Cod. 70. p. 35. l. 15–39.
g iii. 38. h iv. 19; cf. v. 24.
i v. 25. k v. 21, 22. l i. 5.
m i. 44: 46: 63: 83; iii. 11: xvii. 52.

date of the Julian correction, B.C. 45. He was consequently in Egypt before the Julian year had yet been heard of at Rome, and very probably any where else in Italy, as a civil year, and as applied to the calendar for the actual regulation of annual civil time. We cannot therefore with any probability suppose that his testimony, relating to the peculiar calendar of the Egyptian Thebans, could possibly have been affected by his previous knowledge of any such year as the Julian, through the medium of the Roman correction of Julius Cæsar. Nor can we draw any inference from this testimony itself but *one;* viz. that the Egyptian Thebans, when he was among them, had a Julian calendar; a calendar peculiar to themselves, and different from that of the rest of the Egyptians, which nevertheless was Julian: a calendar, in which the length of the civil or calendar year was that of the mean Julian, 365 days and a quarter.

ii. *Λέγονται δὲ καὶ ἀστρονόμοι καὶ φιλόσοφοι μάλιστα οἱ ἐνταῦθα ἱερεῖς. τούτων δ' ἐστὶ καὶ τὸ τὰς ἡμέρας μὴ κατὰ σελήνην ἄγειν ἀλλὰ κατὰ ἥλιον, τοῖς τριακονθημέροις δώδεκα μησὶν ἐπαγόντων πέντε ἡμέρας, κατ' ἐνιαυτὸν ἕκαστον· εἰς δὲ τὴν ἐκπλήρωσιν τοῦ ὅλου ἐνιαυτοῦ ἐπιτρέχοντος μορίου τινὸς τῆς ἡμέρας, περίοδόν τινα συντιθέασιν ἐξ ὅλων ἡμερῶν καὶ ὅλων ἐνιαυτῶν τοσούτων ὅσα μόρια τὰ ἐπιτρέχοντα συνελθόντα ποιεῖ ἡμέραν*[n]. This passage of Strabo's also relates to the priests of Egyptian Thebes. Strabo too visited Egypt in person, in the reign of Augustus; under the government (or præfectura) of Ælius Gallus, B. C. 26–24[o], as he gives us himself to understand: though his work does not appear to have been completed or made public before the reign of Tiberius, and A. D. 17–19[p]. His visit was consequently nineteen or twenty years later than the Julian correction, B. C. 45: and it might have been contemporary with the Alexandrine correction in Egypt itself, or only a year later than it. We could not therefore venture to say that he could have known nothing of the principle of the Julian year before he visited Egypt: and yet it must still have been inferred, from the obscure and indefinite manner in which he alludes to and describes the cycle of leap-year,

n Strabo, xvii. 1.

o See our Dissertations, Diss. v. vol. i. 252–257: Diss. xiv. ibid. 508.

p Ibid. Diss. xiv. i. 536: App. Diss. vi. vol. iii. 366, 367.

that he could not have been very familiar with the idea of this kind of year, even when he was in Egypt.

His testimony therefore, in the above passage, must be regarded as a simple attestation to the matter of fact with respect to the calendar at Thebes; as he became acquainted with it when he was there. It is evidently to the same effect as Diodorus': and it supplies an important omission in the latter. It was left uncertain by that, whether the Egyptian Thebans intercalated a quarter of a day every year, or one day every four years; and this point is clearly determined by the testimony of Strabo: from which it appears that they took the quarter of a day (or epact as he seems to have considered it) into account only in a certain number of years; and that too the proper number in which this quarter of a day accumulated to an entire day; i. e. four years.

We are justified therefore in inferring from both these testimonies in conjunction, that the Egyptian Thebans, in the time of Diodorus and Strabo, had not only a Julian year in use among them, in which the excess of the Julian over the equable year of 365 days must some time or other, and according to some rule or other, be regularly taken into account; but also a proper Julian cycle of the leap-day: a Julian year in which this excess was actually taken into account every four years; i. e. as often as it amounted to an entire day. Such a Julian year, if this cycle of the leap day peculiar to it had only agreed with that which the dictator Cæsar appointed for the use of his own calendar, must have been absolutely the same with the Julian year properly so called; with the Julian year which we are using ourselves at this present day in the form of the Gregorian; for that too is derived from the Roman correction of the dictator Cæsar. The Egyptian Thebans then, if Diodorus and Strabo are to be believed, had a Julian calendar in their time; a calendar Julian in principle and Julian in details: a calendar in which the cycle of leap-day was the proper and legitimate cycle of the Julian year itself. But it was peculiar to these Egyptians of Thebes. There is not the least reason to infer from either of these testimonies that the calendar which they describe was common to the Egyptians in general, and not exclusively confined to the Egyptians of Thebes. And yet

the distinction itself, thus established, is very remarkable: That there was one city in Egypt, and that city one of so much importance and consequence as Egyptian Thebes or Diospolis, in which the recognised calendar was Julian; though every where else, for any thing which is known to the contrary, down to the date of the Alexandrine correction at least, it was the primitive equable year.

SECTION II. *On the Metonic calendar of Egyptian Thebes. Testimony of Herodotus.*

Ὅσοι μὲν δὴ Διὸς Θηβαιέος ἵδρυνται ἱρὸν, ἢ νομοῦ τοῦ Θηβαίου εἰσὶ, οὗτοι μὲν νῦν πάντες ὀΐων ἀπεχόμενοι αἶγας θύουσι. θεοὺς γὰρ δὴ οὐ τοὺς αὐτοὺς ἅπαντες ὁμοίως Αἰγύπτιοι σέβονται πλὴν Ἴσιός τε καὶ Ὀσίριδος· τὸν δὴ Διόνυσον εἶναι λέγουσι· τούτους δὲ ὁμοίως ἅπαντες σέβονται. ὅσοι δὲ τοῦ Μένδητος ἔκτηνται ἱρὸν ἢ νομοῦ τοῦ Μενδησίου εἰσὶ οὗτοι δὲ αἰγῶν ἀπεχόμενοι ὄϊς θύουσι. Θηβαῖοι μὲν νῦν καὶ ὅσοι διὰ τούτους ὀΐων ἀπέχονται διὰ τάδε λέγουσι τὸν νόμον τόνδέ σφι τεθῆναι.

Ἡρακλέα θελῆσαι πάντως ἰδέσθαι τὸν Δία, καὶ τὸν οὐκ ἐθέλειν ὀφθῆναι ὑπ' αὐτοῦ. τέλος δὲ ἐπεί τε λιπαρέειν τὸν Ἡρακλέα τὸν Δία μηχανήσασθαι κριὸν ἐκδείραντα προέχεσθαί τε τὴν κεφαλὴν ἀποταμόντα τοῦ κριοῦ, καὶ ἐνδύντα τὸ νάκος οὕτω οἱ ἑωϋτὸν ἐπιδεῖξαι. ἀπὸ τούτου κριοπρόσωπον τὤγαλμα τοῦ Διὸς ποιεῦσι Αἰγύπτιοι· ἀπὸ δὲ Αἰγυπτίων Ἀμμώνιοι, ἐόντες Αἰγυπτίων τε καὶ Αἰθιόπων ἄποικοι καὶ φωνὴν μεταξὺ ἀμφοτέρων νομίζοντες· δοκέειν δὲ ἐμοὶ καὶ τοὔνομα Ἀμμώνιοι ἀπὸ τοῦδέ σφι τὴν ἐπωνυμίην ἐποιήσαντο· Ἀμμοῦν γὰρ Αἰγύπτιοι καλέουσι τὸν Δία. τοὺς δὲ κριοὺς οὐ θύουσι Θηβαῖοι, ἀλλ' εἰσί σφι ἱροὶ διὰ τοῦτο. μιῇ δὲ ἡμέρῃ τοῦ ἐνιαυτοῦ ἐν ὁρτῇ τοῦ Διὸς κριὸν ἕνα κατακόψαντες καὶ ἀποδείραντες κατὰ τὠϋτὸ ἐνδύουσι τὤγαλμα τοῦ Διός· καὶ ἔπειτα ἄλλο ἄγαλμα Ἡρακλέος προσάγουσι πρὸς αὐτό. ταῦτα δὲ ποιήσαντες τύπτονται οἱ περὶ τὸ ἱρὸν ἅπαντες τὸν κριὸν, καὶ ἔπειτα ἐν ἱρῇ θήκῃ θάπτουσι αὐτόν [q].

Though the editors and commentators of Herodotus do not appear as yet to have divined the import of this curious piece of mythology; its meaning, in our opinion, is sufficiently clear and obvious. The Jupiter of Thebes, as he was styled by the Greeks, and his namesake the Ammoun of the Egyptians, was the type of a solar calendar: Hercules, as he

q ii. 42.

was called by the Greeks, Khons, as the Egyptians themselves denominated him, was the representative of a lunar calendar: and the object of the preceding fable was nothing more or less than to convey, and yet to disguise, a very simple and very certain truth, inseparable from the relation of a solar and a lunar calendar one to the other; viz. that they can return to a state of coincidence, agreeably to the first principles of that relation, only after a stated interval of time and only on a stated day.

On this principle, it is easy to see that Hercules, as the fable supposes, must be represented as long desirous to see Jupiter before his desire could be granted: for a lunar calendar which stands in a certain relation to a solar, and is regulated by a cycle of some kind, in the course of which it returns to the same state of relation to the solar as at first, must be considered to be *tending* to that *return,* to that state of relation, even from the moment that it has begun to depart from it; to be taking that course, from the very first, which must ultimately lead to this return again. This is, no doubt, what the fable intended by the desire and even importunity of Hercules to see Jupiter, so long before it was granted. On this principle too it is easy to perceive that, however importunate Hercules might be to see Jupiter, Jupiter must not be seen by him for a time; Jupiter must refuse to be seen by him for a certain length of time: for the course of a cycle can neither be accelerated nor retarded. It must run through its proper period, whatsoever that is. It cannot be cut short before its time. It is easy to see notwithstanding that the importunity of Hercules must prevail at last; that Jupiter must consent to be seen by him at last: for every cycle must come to an end as soon as its proper period is completed; and if it is to be continued after that, it must be by beginning again, in order to run through the same course as before. It is evident too that, though Jupiter must be represented in such a fable as consenting to be seen by Hercules at last; it could be only for *one day.* A solar and a lunar cycle return to a state of coincidence at the end of their proper period, but it is only for one day; at least it is only *on one day;* the day which is the proper epoch of both; the day on which the proper solar and lunar momenta

of such a cycle do both begin. For every lunar and solar cycle must have such an epoch: and none can have more than one.

It further appears however, even from the fable itself, that when Jupiter was seen by Hercules at last, though only after a certain time and for one day, it was in the disguise of a ram: which is a very significant way of intimating that the conjunction of this solar and this lunar cycle took place in the sign of the Ram. And since it appears from it also, that Jupiter assumed this disguise of a ram on purpose to be seen by Hercules in *that form*, yet on this *one day* only; another very obvious inference from this mode of representing the state of the case with reference to these two cycles is That they coincided for one day, but one day only, in the sign of the Ram; and *that* one day the *first* day on which they could meet and coincide in that sign, the day of the sun's entering the Ram itself; that is, the day of the vernal equinox, mean or true.

It seems from Herodotus' account of the rest of this fable, that though the ram was neither eaten by the Thebans at any time, nor sacrificed at any other time but this, it was usual with them to sacrifice one on this day, the supposed day of the manifestation of Jupiter to Hercules; in the fleece of which the image of Jupiter was wont to be dressed, in order to be exhibited to that of Hercules on this one day, under the same circumstances as Jupiter himself was represented to have been at first to Hercules on the same day. And this day, it appears, was the stated day of the feast of Jupiter at Thebes. Whether this was done every year, even there, on this day, is not distinctly asserted in the same account; and as it appears to us, without a plain intimation to that effect, it is not to be necessarily inferred from it. In the allegorical sense of this manifestation, (if we have explained it rightly,) i. e. in the case of the return of solar and lunar time to the proper relations of origination, such a manifestation every year would not be possible. It is evident too, that the ram, supposed to be sacrificed on this one day and for this particular purpose, was not treated as an ordinary victim; but, after being sacrificed, was lamented by the priests as something the death of which might be inevitable at such a time,

but was nevertheless to be lamented. Nor was it disposed of as an ordinary victim; that is, eaten, or burnt on the altar: but buried, and in a sacred sepulchre of some kind or other. Now these coincidences must remind us of the Apis and of the Apis cycle; of the Apis, the type of a lunar and solar cycle, which, after living the appointed length of time, the duration of its proper cycle, the priests were obliged to put to death, and yet were bound to lament, and were wont to lament, as something sacred; and to bury also, and with all possible honours, in a sacred sepulchre. It is manifest, that so far as this account of the treatment of either is concerned, there could not be a shadow of difference between the ram of Thebes and the Apis of Memphis; except that the former was a ram, the latter was a bull. Was the Apis then the type of a lunæsolar cycle at Memphis, and must not the ram have been the same at Thebes? In this case however we cannot hesitate to infer that this ram could have been sacrificed, under the circumstances supposed by Herodotus, only once in the course of this cycle; and that, at the beginning of the cycle, on the stated date of the reunion of solar and lunar time in such a cycle: which of course could be only at the beginning, and on the first day of the cycle itself. And this day being designated by Herodotus, in express terms, as the feast day of Jupiter at Thebes; we infer from that fact that his proper feast day at Thebes was this same day on which the solar and lunar time of such a cycle, at stated times, met together. There is such a day in every lunæsolar cycle; a day common indeed to the moon and to the sun at once only at the beginning of the cycle, but the proper date of the solar cycle in every year of the cycle alike. It is manifest too that a sacrifice like this, limited to one day in the year, whether offered annually or only after a stated number of years, would still be offered, as Herodotus says this was, *μιῇ ἡμέρῃ τοῦ ἐνιαυτοῦ.*

Now these two facts having thus been ascertained from competent testimony, i. That there was a Julian calendar at Egyptian Thebes; ii. That there was a solar and a lunar cycle there too, one critically adapted to the other: it follows that the solar element which entered into such a cycle must have been the Julian year: and if so, the lunar must

have been either the octaëteric or the Metonic cycle. For there is no form of the lunar cycle which is capable of being combined with the solar, in the sense of the Julian, but one of these two, unless we should add to them the hekkaidekaëteris; which however is only the octaëteris in another shape. And besides the hekkaidekaëteris in this instance is excluded by the circumstances of the case; because, in the cycle described by Herodotus in the allegory in question, the same nominal lunar time did certainly return to the same nominal solar time, after the interval which constituted the period of the cycle; and this is what lunar time never can do in the hekkaidekaëteris, though it will in the octaëteris. But on the other hand, true lunar time cannot return to the same nominal solar time in the octaëteris: only in the enneakaidekaëteris or the Metonic cycle. Now it is clearly implied in the preceding account, disguised as it is, that *true* lunar time returned to the same *nominal* solar, in this lunæsolar cycle of Thebes, typified by Jupiter and by Hercules. We cannot hesitate therefore to infer that the lunar element, combined with the solar, in the form of Julian, in this cycle, must have been the Metonic. It could have been neither the octaëteric nor the hekkaidekaëteric, distinct from that: not to say that the Egyptian priests in general, and in particular those of Heliopolis, of Thebes, and of Memphis, were much too well acquainted with both the theory and the praxis of true solar and true lunar time, and with the relation of the mean Julian year to each, ever to have thought of combining so defective a standard of mean lunar time, as that which enters into the octaëteric cycle, with solar time in the sense of Julian.

It appears then that the Egyptian Thebans had a Metonic calendar, as well as a Julian one; the proper date of which, as far as we have hitherto been able to discover, must have been some time or other the date of the vernal equinox, mean or true. The fact of this Julian calendar we collect from Diodorus and Strabo: that of the lunar, or of the Metonic cycle combined with the Julian, we infer from the fable related by Herodotus. We have met with no express testimony to the existence of this lunar calendar at Thebes in Egypt, distinct from this. Possibly however it may be implied

even in the two following passages, one from Stephanus Byzantinus, the other from Antigonus Carystius. i. Stephanus Byz.[r] : Ἔστι καὶ ἄλλη Αἰγυπτία· περὶ ἧς Καλλίμαχός φησιν, ὅτι κατὰ τὰς Αἰγυπτίας Θήβας ἐστὶ σπήλαιον, ὃ ταῖς μὲν ἄλλαις ἡμέραις πληροῦται ἀνέμων κατὰ δὲ τὰς τριακάδας οὐ πνεῖ παντελῶς. ii. Antigonus Carystius[s] : Ἑλλάνικος δὲ ὁ Λέσβιος ἐν Θήβαις ταῖς Αἰγυπτίαις ἱστορεῖ σπήλαιον, ἐν ἄστει, καθ' ὃ εἶναι τὰς μὲν τριακάδας νηνεμίαν τὰς δ' ἄλλας ἡμέρας ἄνεμον. For the τριακάδες in the Greek idiom were properly the 30th of the lunar month : so that, if Hellanicus and Callimachus used this term advisedly of the days in question at Egyptian Thebes, they must have supposed them the last days of the month there, in a lunar calendar, not a solar. We may conceive too that, for some reason or other, the last day of the lunar month, and just before the conjunction, might be supposed to exhibit a phenomenon of this kind in the absence of wind; but not the last of the solar.

SECTION III.—*On the confirmation of the above conclusions relating to the Julian and to the Metonic calendar of Egyptian Thebes, by other facts.*

We are not indeed in possession of the means of reducing both these calendars to absolute certainty, by defining the dates of each; yet we believe that the true explanation of the fable, which we have been considering, is the following fact ; viz. That B. C. 889, A. M. 3116, æra cyclica 3118, when the first day of the equable Thoth was falling on March 30 at 18 hours, or March 31 at midnight; and when the mean vernal equinox, for the meridian of our tables, was falling March 31, at 14 h. 36 m. 36 s., the priests of Egyptian Thebes determined on the adoption of a Julian calendar, and of a lunar calendar also in the form of the Metonic cycle : the date of both which they attached to this day, March 30 at 18 hours, or March 31 at midnight. There can be no doubt concerning the mean vernal equinox on that day, March 31. There can be as little about the true lunar conjunction on that day; because there was a solar eclipse B. C. 889, March 31 at 7 A. M. for the meridian of Paris; and therefore 2 h. 1 m. later for that of Thebes ; which

r Θήβη.

s Mirabilium Historiarum cxxxix. p. 105.

might have been visible at Thebes itself. A Julian and a Metonic calendar consequently, coming into existence on this day, would come into existence both at the true mean vernal equinox and at the true lunar conjunction simultaneously.

The first probable confirmation of this fact, which we have to produce, is the following. In the Egyptian antiquities of Mr. Birch [t], and in the account of an Exvotos, at Gebel Selseleh, (the ancient Silsilis,) supposed to bear date in the 42d year of Ramses (Rameses) the Great, we find it mentioned that, according to the calendar quoted by Champollion, the stated date of the principal festival of Amoun-Ra (the Amoun of Thebes) was the 19th of Pachon. Let us be allowed to assume that this is what Herodotus meant by the *ὁρτὴ τοῦ Διὸς* at Thebes; and by the date of the manifestation of Jupiter to Hercules: and yet that it coincided with March 31. Now the 19th Pachon coinciding with March 31, Thoth 1 must coincide with July 16; as the following scheme will shew.

Months.			Months.		
i	Thoth	July.. .. 16	vii	Phamenoth	January .. 12
ii	Phaophi	August .. 15	viii	Pharmuthi	February .. 11
iii	Athyr	September 14	ix	Pachon	March .. 13
iv	Chœac	October .. 14	x	Paüni	April 12
v	Tybi	November 13	xi	Epiphi	May 12
vi	Mecheir	December 13	xii	Mesore	June 11

xiii Epagomene July 11.

Now this date of July 16 is remarkable on many accounts. It was the date of the third division of the year into periods of 120 days, in the Phœnix type of the Julian calendar, of the date of November 18 B. C. 1847. It was the stated date of that division of the seasons which was properly to be called and considered the season of the waters: and what was still more likely to make it important and interesting to Egyptian Thebes in particular, and to Upper Egypt in that quarter in general, it was the stated date of the rising of Sirius for their latitude; just as much as July 21 for that of Heliopolis and Memphis. A Sothiacal period, and a Julian calendar, attached to July 16, would be just as natural and just as much in character for this latitude, as one attached to July 21 for that of Heliopolis or of Memphis. We are not indeed of

[t] Part i. p. 3.

opinion that Egyptian Thebes had a Sothiacal period and a Sothiacal calendar of its own, attached to July 16; in contradistinction to the proper period and proper calendar of that kind, attached to July 21. There is no evidence of any such calendar, except on the monuments. And the evidence of the monuments on all questions of fact of this kind, in our opinion, is justly to be suspected. But that the monuments might assume the existence of such a calendar, and as attached to July 16, (the stated date of the panegyry of the waters for all Egypt in ancient times, the stated date of the rising of Sirius, for the latitude of Thebes, in their own time still,) was very possible: and if they did, the 19th Pachon in such a calendar must necessarily fall on March 31. And if it did, and Pachon 19 was the feast day of Amoun-Ra at Thebes, then March 31 was this feast day too; and if this feast of Amoun-Ra at Thebes was also the ὁρτὴ τοῦ Διὸς there of Herodotus, then the lunæsolar calendar of the Thebans, attached to the same day as this ὁρτὴ τοῦ Διὸς, was attached to March 31.

In the next place, we observe that the testimony of Plutarch and Porphyry, produced supra [a], was express to the fact that the colour of the Bull called Mneuis, the sacred Bull of Heliopolis, was *black*, and totally black too: and this was a point on which they could not be mistaken. It was not without reason that this Bull was appointed to be *black;* or why none but a *black* Bull could have been considered suitable to the relation in which it was supposed to stand to the sun. For this Bull was the type of the sun; and the sun itself, as the Egyptians knew when they invented the fable of the Mneuis, had itself, at the beginning of things, been produced out of darkness. The Apis too was black: for the moon at the conjunction is necessarily dark and invisible also.

On the other hand, a Bull is often to be met with on the monuments, evidently as peculiar to Thebes, evidently as standing in a particular relation to Amoun-Ra, and evidently as divine; which Bull is always white [b]. It is true we meet with no allusion in antiquity any where, except on the monuments, to the existence of this white Bull at Thebes: nor do we believe ourselves that any such white Bull ever did

[a] Page 149. Diss. xvi. ch. i. sect. i. [b] Ibid. p. 170. sect. vi.

exist there, except on the monuments. That however is not the question with which we are concerned. The whole of this monumental history and chronology is fictitious from beginning to end; and the supposed existence of this white Bull at Thebes, in contradistinction to the black Bull at Heliopolis, and as the Mneuis of Amoun-Ra or the sun of Thebes, in point of fact is a mere fiction too; the bare mention of which would have astonished Plutarch, or Porphyry, or Diodorus, or any of the ancients who has left the most particular account of the sacred animals of Egypt: though it has excited no surprise, nor given occasion to any suspicion of the truth of the monumental representations, in the apprehension of those who consider themselves the wisest, the most learned, the most sharpsighted, and the most philosophical of our own time.

The white Bull of Thebes then cannot be regarded as a real historical animal of its kind, like the black Bull of Heliopolis. But the idea of this Bull might evidently be borrowed from the latter: and the black Bull of Heliopolis having always been sacred to the sun, so would this white Bull of Thebes be supposed to be; and as the former was associated with Ra, so would the latter be with Amoun-Ra. It is exceedingly probable that, when the type of the Mneuis cycle was thus adopted at Thebes for a particular purpose, the cycle itself would be adopted along with it; in other words, that this white Bull of Amoun-Ra would be associated with a period of 30 years as much as the black Bull of Ra at Heliopolis; though possibly not with the same cycle of 30 years, but with a cycle of the same kind, more or less different from that.

Now fourteen cycles of 30 years are equal to 420 years: and if we go back 420 years from B.C. 889, we come to B.C. 1309. In the Exvotos of Selsileh, to which we have already referred, the 31st of the panegyries of Amoun-Ra is supposed to have coincided with the 42nd year of Rameses the Great. We have already shewn [c] that the first year of Rameses in this monumental chronology was purposely attached to the first year of the Sothiacal period, B.C. 1350; so that his 42nd year would be the 42nd year of that period, which

[c] Supra, p. 157: Diss. xvi. ch. i. sect. iii.

would begin, in the cyclical type of equable time, on Thoth 1 at midnight, æra cyc. 2698, in the Nabonassarian on Thoth 6 the same year; the former corresponding to July 11 at midnight, B. C. 1309, the latter to July 16. This is a singular coincidence; that 14 periods of 30 years from B.C. 889 should bring us to the 42nd year of Rameses the Great, in the monumental chronology, and to the 42nd year of the Sothiacal period also, and to July 11 the first of the Epagomenæ in the Julian type at this time, which bore date July 16 in the first year of the Sothiacal period.

But what are we to understand by the panegyries of Amoun-Ra? An annual festival or not an annual one? Certainly not an annual one: for in that case the 42nd year of Rameses could never have been coinciding with the 31st of those panegyries; there must have been one such panegyry every year of his reign. But if these panegyries were not annual, what were they? We have no hesitation in answering, Thirty-year panegyries — panegyries thirty years asunder; panegyries measured by the cycle of the white Bull; (a cycle like that of the black Bull;) and purposely attached to this date, July 11, the Epagomenæ of the Julian type supposed to bear date July 16; and purposely celebrated until the first of Thoth in that date, July 16, itself. Not that either this Julian type, or this white Bull, or this cycle of 30 years appropriated to it, or these panegyries, celebrated from July 11–16, ever had a real historical existence; like the Julian type of Nov. 18, B. C. 1848, and the Mneuis cycle of Oct. 9, B. C. 1681, and the panegyry of the waters, July 16–22: but simply that all these things were imagined and assumed on the monuments as having a real existence, in imitation of the others which had such an existence.

Let it be supposed then that the 31st of these panegyries, which we have thus connected with the 15th carried regularly back from B. C. 889, was coinciding with July 11 B. C. 1309, the supposed 42nd year of Rameses the Great. Thirty periods of 30 years are equal to 900 years: and 900 years, reckoned back from July 11 B. C. 1309, bring us to July 11 B. C. 2209: which must have been the assumed date of the first panegyry of Amoun-Ra, if B. C. 1309 was that of his 31st. It is a curious question, why these cycles should

have stopped here; why they were not set back to B.C. 2347; or to B.C. 2329, the nearest cyclical date of that kind to B.C. 2347, the date of the descent from the ark? The true reason probably is that B.C. 2209 was only 38 years later than the Scriptural date of the Dispersion, B.C. 2247: and it was possibly the time when the first settlers arrived in Egypt. So that, on this principle, Amoun-Ra, his Bull, and these cycles, would all be supposed to have come up together, in the very first year of the existence of Egypt as a nation. It cannot be denied that these are singular coincidences; which could scarcely have been the effect of chance.

iii. The cycle of leap-year in this Julian calendar of Thebes would be absolutely the same with the Julian; only that its proper date would be the 31st of March, instead of the 1st of March, in the first year of the cycle of leap-year. It would differ consequently only *per accidens* from that of the Sothiacal type of the Julian calendar, July 22 B.C. 1350. July 22 B.C. 890 for example would be the first year of the cycle in this latter; March 31 B.C. 889 the first in the corresponding cycle of the Julian calendar of Thebes. The scheme of this calendar, round the year, would be as follows:

Julian calendar of Egyptian Thebes.

March 31 B.C. 889.

Months.				Months.			
i	Thoth	March	31	vii	Phamenoth	September	27
ii	Phaophi	April	30	viii	Pharmuthi	October	27
iii	Athyr	May	30	ix	Pachon	November	26
iv	Chœac	June	29	x	Paüni	December	26
v	Tybi	July	29	xi	Epiphi	January	25
vi	Mecheir	August	28	xii	Mesore	February	24

xiii Epagomenæ March 26.

We have no doubt that the names of the months, Thoth, Phaophi, and the rest, would be as true of this Julian type at Thebes, and wheresoever else it might be used, as of the cyclical or equable calendar itself; much more as of the Phœnix or of the Sothiacal Julian type, common to the priests of Egypt in general. It is evident too that the first of Thoth in this type falling on the mean vernal equinox, in the 8th degree of the sphere of Mazzaroth at this time,

March 31, the summer solstice would fall on the 3rd of Chœac, July 1; the autumnal equinox on the 4th of Phamenoth, September 30; and the winter solstice on the 5th of Paüni, December 30: each in the 8th degree of the corresponding sign of Mazzaroth.

Now it appears from the sculptures on the monuments[d] that the hieroglyphical name of the Egyptian *Anoup*, (the Anubis of the Greeks and Romans,) was *Ho-phi-oue;* which means "seated in the roads:" and that he was commonly represented in the form of a jackal seated on a door or gate, in order to intimate the relation in which he was supposed to stand to the sun, as doorkeeper of the way of the sun, as seated in the path of the sun, as having the charge of the tropics or equinoxes, which were most eminently the doors or passages of this kind, through and by which the sun passed from one hemisphere to another, or from one quarter or season of the year to another. In this capacity and in this relation to the sun, it is evident that these jackals, the types of Anubis, could never with propriety be represented as occupying any position on the sphere, but these cardinal ones of the equinoxes or of the solstices.

Now there are two of these[e] on the astronomical cieling of the Memnonium; one of which is called *Rokh-naa*, meaning the *Hophioue* of the greater heat; the other *Rokh-kougi*, meaning the *Hophioue* of the lesser heat: and they are so disposed relatively to the months in that representation, that the former evidently had the month Mecheir, the latter the month Phamenoth, under his charge. These were consecutive months, Mecheir being the sixth, Phamenoth the seventh; and on this principle Mecheir was the month of the greater heat; Phamenoth the month of the lesser heat.

There was a stated period in the Egyptian year, as we shewed on a former occasion[f], when the hot winds began to blow, and during which they continued to blow; a period which appeared to have been regularly dated from May 17 to June 26. When this period arrived, and these winds set in, the intensity of the heat might be said to increase; when they ceased it might be said to abate. But on this principle

[d] Egyptian Antiquities, i. 43. [e] Ibid.
[f] Apis calendar, Diss. xiii. ch. iv. sect. 3. vol. ii. 560.

the month Mecheir must have coincided with May 27, and the month Phamenoth with June 26; and there is no known type of the Egyptian calendar (the fixed or Julian calendar) of which that distinction would hold good. The true explanation of the distinction must be derived from the Julian calendar of Thebes above exhibited.

For the climate of Egypt the whole of the year, from the autumnal equinox to the vernal equinox, as much as from the vernal equinox to the autumnal, is warm; in comparison of other climates. There is no winter in Egypt. Yet even there, one half of the year, from the vernal equinox to the autumnal, is much hotter than the other half, from the autumnal to the vernal; so that, even for the climate of Egypt, there is a distinction of the greater and the lesser heat: there is such a thing as a transition from the greater to the lesser heat, and from the lesser to the greater; the former of which takes place at the autumnal equinox, the latter at the vernal. Now it is manifest that these two Hophioues of the sphere divided the year between them, and that each had six months of the whole or one half to himself; the Hophioue *Rokh-naa* the six months of the greater heat, the Hophioue *Rokh-kougi* the six months of the lesser: and it is evident that the six months of the former ended with Mecheir, the six of the latter began with Phamenoth. If so, Mecheir must have ended, and Phamenoth have begun, at or about the autumnal equinox. We see that this was the case, in the Julian calendar exhibited supra. We must conclude then that the representation on the Memnonium was adapted to that calendar, and to that alone: from which it will follow that it could not be older itself than B. C. 889.

Mr. Birch observes on the same occasion[g], "It was apparently through this door, (that of the Hophioue of the south,) that the exit of the right symbolic eye (of the sun) took place on the 30th of Mecheir." In this allusion to the right symbolic eye there is by implication an allusion to the left symbolic eye, which is supposed to have been typical of the moon[h]. The exits of these different eyes were probably 180 days asunder, or more: and if the exit of the right eye took place on the 30th of Mecheir, when could that of the left take place, except on the 1st of Thoth? which in this

[g] i. p. 43, 44. [h] Ibid. 31.

Julian type of March 31 B.C. 889 would be actually on the day of the new moon.

What Mr. Birch however appears to have had in view in this observation is a part of the Turin Ritual, cap. 140, entitled "The book of the actions on the 30th of Mecheir, during the exit of the eye of the sun[i]." If this is truly to be referred to the 30th of Mecheir in the above type, it is important; as determining the age of the Turin Ritual also to some time later than B.C. 889 at least.

iv. After all, something must be left to conjecture in a case like this. We have already had occasion to consider and explain[k] the remarkable representation found at Thebes, in which Hercules Lunus appeared as the type of the mansions and of the Apis cycle in conjunction; both supposed to have met on the 1st of April, the 11th of Thoth, the stated date of the Apis cycle B.C. 848. It must now appear that he was just as much the proper representative too of his own lunæ-solar cycle, at that very time; for the first day of the Metonic calendar of Thebes, B.C. 848, would be falling on March 28, on the first day of that moon of which the stated date of the Apis cycle, at the same point of time, was the luna quarta*.

But the most observable circumstance is that B.C. 889, our supposed date of this Metonic correction of Egyptian Thebes, stands at the distance of 57 years, or of three cycles of nineteen years, from B.C. 946, the date of the lunar Hindu correction. We consider it exceedingly probable that the

* This possible connection of one and the same representation with the Metonic cycle of 19 years at Thebes, the Apis cycle of all Egypt, and the lunar mansions, in this one year B.C. 848, is calculated also to explain the three pillars or cippi, types of certain epochal terms as we considered them, under the two kneeling figures: and perhaps in the most satisfactory manner of all. B.C. 848 was the *fourth* year of the third Metonic cycle, from the epoch of B.C. 889. It is most probable therefore that these three pillars in these instances were meant of the three years of this third cycle, anterior to the epoch of B.C. 848. In the fourth year of every Metonic cycle, the principal date is always three days lower than the epochal date. That is, if the epoch in the first year was March 31, in the fourth year it must be March 28. There were three days consequently between the luna prima of the Metonic cycle, and the luna prima of the Apis cycle; and these three days were probably denoted by the three spades, as the three years were by the three pillars.

i i. p. 43. note. k Vol. iii. 345. Diss. xv. ch. v. sect. vii.

first idea of this Theban correction was derived from the Hindu one. Not that the Thebans had any occasion to borrow from the Hindus the idea of the Julian year; which was so much older among themselves than among the Hindus. But they might borrow from them the first idea of the Metonic cycle, or of the application of the proper lunar calendar to the solar in the form of Julian. It is very remarkable that their Metonic cycle begins only in the last year of the true Metonic cycle from the first: B. C. 889, as our tables shew, being Period xi. cycle iv. 19 in our scheme. There cannot be any question concerning the fact of an intercourse between Thebes and India, at this early time. Proofs have been discovered at Thebes of an intercourse even with China: bottles with Chinese inscriptions having been found in the sepulchres there[1]. In short, we should be altogether of opinion that the mansions passed from Thebes to the Hindus: and that the Thebans borrowed from the Hindus their Metonic cycle*.

* We cannot undertake to exhibit the type of this Metonic cycle of Egyptian Thebes, with confidence; because we do not know enough of its details, or of the actual rule in conformity to which it must have been administered. If however we may assume that it was constructed according to the analogy of one of our own cycles of the same kind, the type of the first such cycle of 19 years must have stood as follows:

1st Metonic cycle of Egyptian Thebes. Epoch March 31 *at midnight,* B. C. 889.

⊙	B.C.	
i	*889	March 31
ii	888	— 20
*iii	887	— 9
iv	886	— 28
*v	*885	— 17
vi	884	April 5
vii	883	March 25
*viii	882	— 14
ix	*881	April 2
x	880	March 22
*xi	879	— 11
xii	878	— 30
*xiii	*877	— 19
xiv	876	April 7
xv	875	March 27
*xvi	874	— 16
xvii	*873	April 4
xviii	872	March 24
*xix	871	— 13

There is reason to infer from the fable related by Herodotus, (of which

[1] Wilkinson, Second series, iii. ix. 106. 107–109.

It is needless to add that, if the Egyptian Thebans did correct their calendar, and on this principle, in B. C. 889,

we have given an explanation,) that the head of this cycle, having been attached in the first instance to the date of the mean vernal equinox, (and in that first instance truly so,) i. e. to the day which truly represented the mean vernal equinox at the time, continued nominally attached to the vernal equinox ever after. If so it must have been attached to the same nominal date of the vernal equinox ever after as at first: i. e. if it was attached to March 31 at first, it must have continued attached to March 31 ever after. The above type of the cycle therefore would be perpetual. It follows that in the course of time the lunar dates of the cycle must rise on the true, and at the rate of one day in 304 years, and of two days in 608 years, and so on.

The Egyptian Thebans having thus been in possession of a Metonic calendar, peculiar to themselves, from as far back as B. C. 889; the introduction and adoption of the Metonic cycle for the use of the Greeks in Egypt, in the form of the Macedo-Egyptian calendar, B. C. 306, would appear nothing new or singular to them in particular; and their own calendar of this kind would be predisposed to be amalgamated with the Macedo-Egyptian. Let us first ascertain in what state of relation to the older calendar of the same kind the younger one would come into being. The date of the Macedo-Egyptian lunar calendar, introduced B. C. 306, was Dius 1 Nov. 2, that year; and the date of its sixth month was Xanthicus 1 March 29, B. C. 305: a full month, by the rule of the Metonic cycle. In the Theban calendar of the same denomination B. C. 305 would answer to Period ii. cycle xv. 15. epoch March 27. There was consequently two days difference between the Macedo-Egyptian Xanthicus and the first month of this Theban calendar at the same time; but this difference was only accidental. It is easy to see that, under such circumstances, the first month in this Theban calendar must correspond to the sixth in the Macedo-Egyptian, (the proper name of which was Xanthicus,) and the second in the former must answer to the seventh in the latter, (the proper name of which was Artemisius.)

Now this being the relation of the two calendars one to the other from the first; since they began respectively at opposite points of the year, and the beginning of each was fixed to its own time and season, but it so happened that B. C. 306 Nab. 442—443 the epoch of the Macedo-Egyptian calendar in particular was falling out almost coincidently with the beginning of the equable year; it is exceedingly probable that in accommodating this latter calendar to their own the Egyptian Thebans would adopt the names of the solar Egyptian months, and substitute them for the Macedonian lunar ones; i. e. that they would give the name of Thoth to the first month Dius, that of Phaophi to the second or Apellæus, and so on; in which case the sixth month Xanthicus in the one would assume the name of Mecheir in the other; and Artemisius the seventh in the former would get that of Phamenoth in the latter.

Now there is an inscription extant in the Corpus Inscriptionum Græc.

they did that which had never been done in Egypt until then; and was never done by any of the Egyptians besides

(tom. iii. P. xxix. p. 363—365, N°. 4717) which proves that this was actually the case. It is an inscription belonging to Thebes or Diospolis Magna itself; and it records a decree passed by the priests of Egyptian Thebes, in the reign of Cleopatra; the last of the race of the Lagidæ who reigned in Egypt. For a more particular account of this inscription we refer our readers to the Corpus Inscriptionum. It is sufficient for our purpose to observe that it was intended to do honour to a certain Callimachus, the fiscal procurator of the queen for the time being, and the local governor of Thebes and the circumjacent district; who had rendered the inhabitants of that city and of the neighbourhood very signal services in a time of great public and private distress.

It is mentioned by Seneca (Nat. Quæst. iv. cap. ii. § 15.) that the Nile did not rise as usual for two years successively, in the reign of Cleopatra: Biennio continuo regnante Cleopatra non ascendisse decimo regni anno et undecimo constat. Cleopatra began to reign U. C. 702 B. C. 52: so that this phenomenon must have occurred B. C. 43 and B. C. 42. It must have been a necessary consequence of so unusual an occurrence, that B.C. 43—42 or 41 would be a period of great privation and suffering in Egypt; in other words of dearth; owing to the total failure of the crops of every kind: a privation which would begin to be felt in the spring of B. C. 42, but would be most severe in that of B. C. 41 and after. And as a period of unusual scarcity and privation is almost always accompanied or followed by one of sickness and mortality also; it is not surprising that (as it appears from Appian B. C. iv. 61–63. 108) at a time which coincided with B. C. 43–42, when Cassius was in the vicinity of Egypt, levying forces and raising supplies of every kind, Egypt was suffering both from famine and from pestilence or sickness; *λιμὸν ὁμοῦ καὶ λοιμόν.*

Now the inscription in question commemorates the services which Callimachus had rendered to Diospolis in particular at this critical juncture: and it recognises not only the scarcity or famine under which the country was suffering at the time, but also some greater and more pressing calamity even than that, which must have been the pestilence, sickness, or mortality to which the famine had given occasion: *Καταλαβούσης δὲ τὴν οὖσαν σιτόδειαν καὶ ἐν τῷ ἐνεστῶτι ἔτει σκληροτέρας καὶ μείζονος συμφορᾶς*: p. 364. l. 14. These words of the inscription are entire. We must infer from them that the scarcity was continuing in the year in which it was penned; aggravated too over and above by a worse and more formidable calamity in the shape of the pestilence. It follows that it must have been penned in the first of the two years alluded to by Seneca; i. e. in the tenth of Cleopatra, U. C. 711–712, B. C. 43–42.

Now this is agreeable to its own intimations. It begins as follows: p. 364. l. 1. Βασιλευόντων Κλεοπ]άτρας *θε(ᾶς) Φιλοπάτορ[ος καὶ* Π]*τολεμαίου τοῦ καὶ* Κα(ί)*σαρος (θ)εοῦ Φιλοπά[τορος Φιλομή[τορος* L ῑ *τοῦ καὶ* $\overline{\beta}$ 'Αρτ]*εμισίου - - Φαμενὼθ - - ἔδοξε κ. τ. λ.* The years indeed have been con-

them, except those over whom they themselves exercised a direct influence. We know of no public adoption of a Julian

jecturally restored. But Cleopatra began to reign U. C. 702 B. C. 52: and the tenth year of her reign must have coincided with B. C. 43–42. Cæsario her son by Julius Cæsar who is here called Ptolemy was born B. C. 47, soon after the departure of Julius Cæsar from Egypt; in which country he had spent nine months at least previously, in the company of Cleopatra: and according to Dio (xlvii. 31) he was associated by Cleopatra U. C. 712 B. C. 42, in the eleventh year of her reign. We are of opinion however with Mons. Le Tronne, that he was really associated a year or two earlier; very probably as soon as he was weaned: which in the East being ordinarily done with children at three years of age, on this principle he would be associated B. C. 44—in the 9th year of Cleopatra; and his *second* year would coincide with her *tenth*, B. C. 43–42.

The question however of these two years respectively does not affect that of the true date of the inscription, which will still be B. C. 42. It is observable that after the year followed the month and the day of the month; the latter unfortunately being lost, but the former being still preserved. And we have both the Greek name of the month and the Egyptian; the former Artemisius, the latter Phamenoth: precedence however being given to the Greek month, and the date running on such and such a day of Artemisius, answering to such and such a day in Phamenoth; not *vice versa*: from which distinction it seems only a reasonable inference that these Egyptian names had been originally accommodated to the Grecian, and not the Grecian to the Egyptian.

Now the Greek name in this instance is Artemisius, the Egyptian is Phamenoth. Let us therefore inquire into the relation of the Metonic calendar of Thebes and of the Macedo-Egyptian calendar, one to the other, in this year B. C. 43–42. In the Macedo-Egyptian calendar, B. C. 43 answered to Period iv. 36 (the 36th year of its fourth Callippic Period) in which Dius 1 bore date Nov. 4 B. C. 43, and Artemisius March 30 B. C. 42. In the Theban calendar, B. C. 42 answered to Period iii. cycle xiii. 12. in which the head of the calendar fell on March 30 also. There was consequently no difference at this time between this month in this calendar and the corresponding one in the other calendar: and the Greek style of this latter being Artemisius, and the Egyptian being Phamenoth, it is evident under these circumstances and at this time that the date might be expressed in terms of either. The actual date indeed is lost after each: but it may be inferred from the vacant space on the marble in each instance that it must have been some date which consisted of two numbers in each; and therefore in all probability was the same in each. Consequently that Artemisius and Phamenoth at this time were absolutely the same; as they appear to have been.

It is observable that though this inscription runs in the name of the priests and elders and of the rest of the people of *Diospolis Magna*, yet the name of Thebes also occurs twice at least upon it. It is observable too

calendar in Egypt, before the date of the Alexandrine correction; and that was not the doing of the Egyptians, but

that the name of the tutelary divinity of Diospolis or Thebes occurs upon it several times, but always in the form of 'Αμουρασωνθήρ: the first part of which is evidently 'Αμουρα; the latter may be a corruption of the Greek σωτήρ: so that the meaning of the whole name on this principle would be Amonra Sospitator. We may collect however from this example that the proper mode of writing the name in Greek was "Αμου not 'Αμοῦν or 'Αμμών.

If we are right in the conclusion at which we have thus arrived, the case which we have just considered is a clear and decisive instance of the application of the common names of the months in the equable Egyptian calendar to the months of a calendar of a totally different kind; and without any regard to the relation of the equable calendar to this other calendar in any other respect. And one authentic instance of this fact must render it less surprising that in the same quarter of Egypt these same names of the equable months should have been given to those of a fixed calendar, like the Julian calendar of Thebes. We have seen some proofs already that this must have actually been done: and it is in our power too, if we are not mistaken, to confirm the same conclusion by the testimony of inscriptions.

There is an inscription extant on the statue of Memnon, consequently at or near Thebes, (Corp. Ins. III. P. xxix. p. 374, 375. No. 4736.) which is dated in the 19th year of the emperor Adrian, and in a month which it calls Adrianus. This part of the inscription is entire: Ἔτους ιθ̄ 'Αδριανοῦ (τοῦ κυρίου) μηνὸς 'Αδριαν(οῦ) . , . No one can doubt that this name must have been taken from that of Adrian itself; and therefore it must have been given to this month out of compliment to Adrian: and consequently some time not later than his nineteenth year at least, in which it already bore that name; i. e. not later than A. D. 135–136.

In illustration of this inscription and of this date the editor quotes a papyrus found in the catacombs at Thebes also: in which the following date occurs: L ῑ 'Αντωνείνου Καίσαρος τοῦ Κυρίου μηνὸς 'Αδριανοῦ η̄ κατὰ δὲ τοὺς ἀρχαίους Τυβὶ ιη̄. This emperor is understood to be Antoninus Pius, whose tenth year corresponded to A. D. 147–148. But this is of less importance. We learn from this record that the 8th of the month called Adrianus corresponded to the 18th of that called Tybi. Consequently, the first of the former must have corresponded to the eleventh of the latter.

The Alexandrine Tybi and the equable Tybi at this time (i. e. all through the reign of Adrian) being supposed to be excluded by the circumstances of the case and to be set aside; let us turn to the scheme of the Julian calendar of Egyptian Thebes given at p. 227 supra, but under the common names of the equable Egyptian months. In that scheme the stated date of Tybi is July 29; and therefore that of the 11th of Tybi is August 8. And supposing this to be the Tybi actually meant in the date of the Papyrus above produced, the first of Adrianus must

of the Egyptian Greeks. Their calendar was still peculiar to them in the time of Diodorus and Strabo. We are not likely ever to know the reasons which induced the priests of Thebes thus to act independently of the rest of the priests of Egypt, and in so remarkable a manner as by substituting the

have been August 8. Now the date of the adoption of Adrian by Trajan was v Ides of August, A. D. 117; and that of his accession was iii Ides of August the same year: the former of which in the Julian notation of such Roman dates would be August 9, the latter August 11. The Roman kalends indeed at the beginning of the reign of Adrian were one day higher than the Julian: but they were originally left by Cæsar two days lower; and this very year, A. D. 136, the 19th of Adrian, they began to be one day lower. In the first instance, the v Id. Aug. corresponded to August 7; and this year it did so to August 8.

It appears to us that this coincidence supplies the only probable and consistent explanation of the name of this month Adrianus, peculiar as it would appear to Upper Egypt in general or to Thebes in particular. It was given to the fifth month in the proper Julian calendar of Egyptian Thebes, in order to do honour to Adrian; because both his adoption and his accession happened to fall out in that month. The learned editor of the Corpus Inscriptionum treats it as if it were entirely an *imaginary* month, or nothing more than an arbitrary period of 30 days; each of them an *ἐπώνυμος* of Adrian, or called after the emperor Adrian: an opinion sufficiently refuted by the fact of its occurring as an actual month in actual dates on extant inscriptions, or in other matter of fact records which still survive. We may however admit its positive or imaginary nature so far as to allow that it could never have taken the place of the month Tybi in the Theban calendar: yet it must notwithstanding have been the name actually given to the 30 days which extended from the 11th of that month to the 11th of the next.

With respect to the qualification of the corresponding month, in the Papyrus quoted supra, the 18 Tybi *κατὰ τοὺς ἀρχαίους*—i. e. as we should say, *old* style, in contradistinction to *new* style—a similar mode of speaking occurs on two other monuments in this collection, No. 4987 page 462, and No. 5020 page 471: both however from Nubia; and from the stone quarries in Nubia, worked under the Roman government—see p. 459; that is, from that part of Upper Egypt in which the Julian calendar of Thebes, or one altogether the same with it, appears to have been received also from the first. This calendar was a thousand years old in the time of Adrian and of the Antonines; and it might well be called the *old* style in those quarters in which it had first come into use: particularly if a modern calendar of the same kind (like the Alexandrine) was now fast superseding it even in the same parts. This might easily be the case; for, excepting the nominal order of the months and the seat of the Epagomenæ in each, the Alexandrine and this differed only by a day.

Julian and the Metonic calendar for the primitive equable solar year, and for its natural lunar cycle the Apis cycle. And very probably the true reasons of their conduct lie much deeper, and affect the question of the whole origin and contrivance of the monstrous system of chronology and of history consigned to the monuments; which, as far as we have been able to discover, appears to have taken its rise in upper Egypt, and in the Thebaïd, and to have been almost exclusively confined to it. We have no doubt too that, if the truth were known, their conduct would be seen to have given offence to the rest of their brethren in Egypt, particularly to those of Heliopolis and Memphis; and that they regarded this innovation as a dangerous precedent, inconsistent with the continued observance of their oldest and most characteristic usages: and that very probably it was owing to this innovation that they introduced those words into the coronation oath of their kings, at the ceremony of the installation in Memphis, by which they bound them to the constant observance of the equable year; and that consequently this oath itself is not older than the date of this Theban correction, B. C. 889.

SECTION IV.—*On the Amoun and on the Hercules Lunus of the Egyptians.*

The Jupiter of Thebes or Diospolis, so called by Herodotus, though he recognises also his Egyptian name of Amoun, on the monuments goes by the name of Amoun, with the affix of Ra; Amoun-Ra[m]. Ra or Phre is the name of the sun; or a word denoting the solar agency[n]: so that Amoun-Ra would mean Amoun the sun. The name Amoun itself is found variously written: but in the hieroglyphical character it is Amn: and it is symbolized by an obelisk[m]. Amoun, according to one of the inscriptions at Thebes, would appear to mean the disk of the sun: according to Mr. Birch, its true meaning is the same as that of the Coptic, Amoun, "glory." Herodotus, it is evident, considered Amoun simply a proper name for the Egyptian idea of what in the appre-

[m] Birch's Egyptian Antiquities, pt. i. p. 1. Chevalier Bunsen, i. book i. sect. vi. A. 369–373. Wilkinson, Second series, i. xiii. 243–249. 295.

[n] Egyptian Antiquities loc. cit.: cf. Bunsen, b. i. sect. vi. viii. Ra, p. 387: Wilkinson, Second series, i. xiii. 287. 403.

hension of the Greeks corresponded to Jupiter. The account which the ancients have given of the word and of its meaning is different from any of the above.

Ἔτι δὲ, says Plutarch[o], *τῶν πολλῶν νομιζόντων ἴδιον παρ' Αἰγυπτίοις ὄνομα τοῦ Διὸς εἶναι τὸν Ἀμοῦν, ὃ παράγοντες ἡμεῖς Ἄμμωνα λέγομεν· Μανεθὼς μὲν ὁ Σεβεννύτης τὸ κεκρυμμένον οἴεται καὶ τὴν κρύψιν ὑπὸ ταύτης δηλοῦσθαι τῆς φωνῆς· Ἑκαταῖος δὲ ὁ Ἀβδηρίτης φησὶ τούτῳ καὶ πρὸς ἀλλήλους τῷ ῥήματι χρῆσθαι τοὺς Αἰγυπτίους ὅταν τινὰ προσκαλῶνται· προσκλητικὸν γὰρ εἶναι τὴν φωνήν.* In the Chevalier Bunsen's Vocabulary of Ancient Egyptian Words, recovered from the monuments, Amn occurs in the sense of "to conceal[p];" and he himself appears to be of opinion that the proper meaning of this Egyptian name of Amoun is the "concealed God[q]."

A remarkable fact has been ascertained from the examination of the monuments, with respect to this name of Amoun or Amun-Ra (Amn-Ra); viz. that it has been purposely substituted on them for some other name, which had been so carefully erased that, according to sir Gardiner Wilkinson[r], no one had succeeded in discovering what it was: though the author of the Egyptian Antiquities informs us, in a note[s], that it had been decyphered by a friend of his, Major Felix, and found to have consisted of a vulture flying, with a body formed of an eye, and holding in its claws a signet. The vulture appears to have been the type of the upper hemisphere; the uræus of the lower[t]. We should be of opinion that before the introduction of the worship of Amoun-Ra under that name, (which we think was in the year of the Theban correction, B. C. 889,) the Egyptians had no name for the Supreme Being, but some one denoting concealment or invisibility; and that they represented him symbolically in the manner above described, by the vulture, the type of the upper hemisphere, his proper abode, by the solar eye, as his only sensible image, and by the seal or signet, to imply

[o] De Iside et Osiride, ix. Cf. Iamblichus, De Mysteriis, sect. viii. cap. 3. p. 159. l. 5–9: *Ὁ γὰρ δημιουργικὸς νοῦς . . . ἐρχόμενος εἰς τὴν γένεσιν, καὶ τὴν ἀφανῆ τῶν κεκρυμμένων λόγων δύναμιν εἰς φῶς ἄγων, Ἀμοῦν κατὰ τὴν Αἰγυπτίων γλῶσσαν λέγεται.*

[p] i. App. i. 455. No. 44.

[q] i. App. vi. p. 370, 371.

[r] Second series, i. xiii. 244, 245: cf. 263. 427: Chevalier Bunsen, Book i. sect. vi. A. p. 371. 373.

[s] i. p. 2. note 12: cf. Porphyry apud Eusebium, Præp. Evang. iii. 12. § 3. p. 251, 252.

[t] Ibid. p. 4.

the true concealment of his nature and essence after all. When they at last typified this unseen and incomprehensible Being by the sun, it was still only as Amoun-Ra: as the unseen made visible in the sun. And hence the substitution of the name of Amoun-Ra in every instance where nothing before appeared but the hieroglyphical symbols above described; so that Amoun-Ra on the monuments is the sensible expression of what till then might be conceived in idea, but could not be sensibly expressed: the idea of the invisible Godhead as made visible in the sun*.

* It is asserted by Plutarch[a], that the people of the Thebaïd in Egypt acknowledged no *θνητὸς θεὸς, ἀλλ' ὃν καλοῦσιν αὐτοὶ Κνὴφ, ἀγέννητον ὄντα καὶ ἀθάνατον.* This Κνὴφ was mentioned by Sanchoniatho: *Φοίνικες δὲ αὐτὸ ἀγαθὸν δαίμονα καλοῦσιν· ὁμοίως καὶ Αἰγύπτιοι Κνὴφ ἐπονομάζουσι. προστιθέασι δὲ αὐτῷ ἱέρακος κεφαλὴν, διὰ τὸ πρακτικὸν τοῦ ἱέρακος*[b]. And perhaps by Jamblichus[c], though his text at present in that instance reads Ἠμήφ: Ἠμὴφ, Εὐκτοῦν, Ἀμοῦν, *καὶ* Φθᾶ. Strabo mentions a temple of Κνοῦφις in the island of the Nile *κατὰ Συήνην*[d]: and this too is considered only another name for Κνήφ. In the hieroglyphical character his name is Noum, Nu or Noub; though it is variously written Neph, Nef, Kneph, Chnouphis, Cnoubis, Noub, Nou[e], Nub, Nu, Kneph, Chnubis[f]. This name, and this idea, appear to have been only another name and another Egyptian expression for the idea of the Demiurge, whom they styled Κνήφ[g]. The chevalier Bunsen inclines to that view and construction of his character[h]: and as a further proof of its truth, Kneph has the potter's wheel for his symbol[h]: and according to Mr. Birch[i] his hieroglyphic literally signified *water;* the great ὕλη or material principle out of which all things were produced. His colour, in the sculptures, is green; that of Amoun is blue[j].

The worhip of this Kneph at Thebes is no disproof of that of Amoun-Ra also, who was no more a mortal god than he. The ram-headed god of the monuments appears also under the name of Noufra Noum, i. e. Nouf—the sun[k]; and the sculptures imply that he must have been worshipped at the cataracts, at Syene, at Elephantine, at Snem, at Beghe, at Beit Oually, and at Meroë[k]. It is said that his name has been discovered in the Pyramids, in the ovals or cartouches which pretend to be those of

a De Iside et Osiride, xxi.

b Eusebius, Præp. Evang. i. 10. § 48. p. 92.

c De Mysteriis, sect. viii. cap. iii. 158, 159.

d xvii. i.

e Wilkinson, Second series, i. xiii. 235–237. 241, 242. Birch, Egyp. Ant. part i. p. 9. Bunsen, book i. sect. vi. p. 374.

f Bunsen, book i. sect. vi. p. 374–378.

g Porphyry, Apud Eusebium, Præp. Evang. iii. xi. § 45, 46. p. 248.

h i. 377. Birch, part i. 10. Cf. Porphyry, apud Euseb. Præp. Evang. iii. 12. § 1. p. 250, 251.

i Egypt. Ant. part i. p. 9.

j Bunsen, loc. cit. p. 376. Birch, part i. p. 9.

k Egyptian Antiquities, i. 9.

With regard to Hercules, whom Herodotus had learnt to associate with the Ammon or Jupiter of Thebes in the relation of son; we have seen[u] that his proper Greek name, derived from his Egyptian one, was Χών. On the monuments it occurs in a variety of forms, yet all analogous to each other, and ultimately the same as that Χὼν or Χώνς: Oohensou, Khons, Honsou, Henso, Khonsou, Shons[w]: in the Greek Papyri, Chonsis[w]: Khunsu[x], Khonso[y], Honsoo, Chonsoo[z], Djom or Gom, (Coptic Χωμ, strength) Gignân, Gigôn, as if from γίγας[a]. The idea which enters into Χὼν or Χὼνς at bottom seems to have been that of gigantic power and strength[w]; such as Greek fable attributed to the Atlas who supported the heavens, and to Hercules: and we have seen this Chons represented in the act of supporting the colossal cow itself, which was typical of the heavens. His name occurs only in phonetic hieroglyphics[x]: a remarkable circumstance, and calculated to throw light on the question of the

Cheops, and at Wady Magara[k]. None of these things is any proof of an antiquity greater than B. C. 848. Amoun-Ra indeed is seldom represented with the head of a ram: nor when his worship was introduced at Thebes had the ram yet been laid down on the sphere. In Herodotus' time indeed the statue of the Jupiter of Thebes had the head of a ram[l]; and consistently with the fable which he relates it could scarcely have had any other. This Nouf or Noum on the other hand is always so represented. He was consequently the true Aries of the sphere; and therefore could not be older than B. C. 848, when that zodion was first laid down on the sphere.

At Philæ[m] this Noum the Creator was represented fabricating the limbs of Osiris out of potter's clay; while Hapi-Mooü the Nile supplied him with water. He combined therefore the attributes of Κνήφ with the character of the Aries of the sphere: probably because, as the Egyptians very well knew, the first operation of the Demiurgic power took place in Aries; and the original element or material cause of all things was water. The cosmogonic egg itself was his production. Τὸν δὲ θεὸν τοῦτον (τὸν Κνήφ) ἐκ τοῦ στόματος προΐεσθαί φασιν ὠὸν, ἐξ οὗ γεννᾶσθαι θεὸν ὃν αὐτοὶ προσαγορεύουσι Φθᾶ, οἱ δὲ Ἕλληνες Ἥφαιστον· ἑρμηνεύειν δὲ τὸ ὠὸν τὸν κόσμον[n].

k Egyptian Antiquities, i. 9.
l iii. 181.
m Egyptian Antiquities, part i. p. 161: 25. 29.
n Porphyry, ap. Euseb. Præp. Evang. iii. 10. § 46. p. 248.
u Diss. xv. ch. iv. sect. x. vol. iii. 317.
w Egyptian Antiquities, part. i. 8: cf. note 7.
x Chevalier Bunsen, Book i. p. 391, 392.
y Wilkinson, Second series, i. xiii. 252. 282.
z ii. xiii. 19–21: cf. Bunsen loc. cit. p. 392: ii. xiii. 17.
a i. xiii. 370: ii. xiii. 5.

date of the invention of phonetic hieroglyphics. He has the lunar crescent or disk of Thoth, in his character of Thoth Lunus or the moon God; and in one instance he has also the palm-branch of Thoth notched on the edges, as if he too was the proper keeper of the account of time like Thoth[a]: and this he could be only from the time when the civil calendar became lunar as much as solar—i. e. at Thebes in particular.

It is agreed that the Egyptian Khons was essentially a lunar, not a solar, idea: and as he was always a masculine conception, this was probably the reason why the moon also, in one point of view, was regarded by the Egyptians as a masculine divinity[b]. The ultimate foundation of this idea is probably the fact that this Khons of theirs was first and properly the representative of the lunar mansions: which were a purely lunar idea without any reference to the sun. If the moon is to be regarded as feminine, it must be with a special relation to the sun; such as would be implied in synodic lunar time. But the mansions, in their first conception, had no reference whatsoever to the synodic lunation—merely to the lunar motion in the abstract. According to Mr. Birch[c], Amoun, Maut, and Khons were the Triad of Thebes; Amoun corresponding to Jupiter, Maut to Juno, and Khons or Chons standing to both in the relation of son. All mixture of Greek mythology with Egyptian is to be suspected. It must have been the addition of later times; and could have made no part of the ancient Egyptian fables in their genuine form.

With regard to the number and distinctions of the Herculeses of antiquity, it is not necessary for us to say any thing here[d]. The most famous were no doubt the Egyptian and the Tyrian[d]; in comparison of either of whom the Grecian Hercules, the son of Alcmene, it is agreed was of recent date. The prototype of the Tyrian Hercules was very probably the Egyptian. We cannot however enter on that question at present. We will observe only that the date of

a Wilkinson, Second series, ii. xiii. 19–21. Cf. Bunsen, loc. cit. p. 392.

b ii. xiii. 17: i. xiii. 370: ii. xiii. 5.

c Egyptian Antiquities, part i. p. 2–8.

d See Herodotus, ii. 43, 44. 145. Diodorus, iii. 74. Cicero, De Natura Deorum, iii. 16, 42. Lydus, De Mensibus, iv. 46. p. 82. l. 16. Arrian, De Expeditione Alexandri, ii. 16: iv. 28.

the Theban correction, B. C. 889, is also the date of the Sidonian, attached to the same day, March 31 B. C. 889; and B. C. 837 is the date of the Tyrian, attached to March 18.

SECTION V.—*On the name of Thebes, and on the change of its name to No-Ammon or Diospolis.*

In the opinion of Herodotus[e], the Thebaïd originally constituted the whole of Egypt: all the rest below the lake Mœris, seven days' sail from the sea up the river, being still a marsh. According to sir Gardiner Wilkinson, the site of Thebes was on the east bank of the Nile[f]: according to Pliny[g], it must have been situated on both banks of the Nile, Flumine medium oppidum interfluente.

With regard to the foundation of this city, and its name at first, some of the Egyptians ascribed it to Osiris: Κτίσαι δέ φασι τοὺς περὶ τὸν Ὄσιριν πόλιν ἐν τῇ Θηβαΐδι τῇ κατ' Αἴγυπτον ἑκατόμπυλον, ἣν ἐκείνους μὲν ἐπώνυμον ποιῆσαι τῆς μητρός, (i. e. Juno, as it appears directly after, as if Osiris in this account was the son of Jupiter and Juno, not of Saturn and Rhea,) τοὺς δὲ μεταγενεστέρους αὐτὴν ὀνομάζειν Διὸς πόλιν, ἐνίους δὲ Θήβας[h]. By others this was disputed: Ἀμφισβητεῖται δ' ἡ κτίσις τῆς πόλεως ταύτης οὐ μόνον παρὰ τοῖς συγγραφεῦσιν, ἀλλὰ καὶ παρ' αὐτοῖς τοῖς κατ' Αἴγυπτον ἱερεῦσι· πολλοὶ γὰρ ἱστοροῦσιν οὐχ ὑπὸ τῶν περὶ τὸν Ὄσιριν κτισθῆναι τὰς Θήβας, ἀλλὰ πολλοῖς ὕστερον ἔτεσιν ὑπό τινος βασιλέως περὶ οὗ τὰ κατὰ μέρος ἐν τοῖς οἰκείοις καιροῖς ἀναγράψομεν[h]. By this king he means a second of the name of Busiris, the 61st from Menes[i].

A tradition which claimed Osiris as the founder of Thebes could not be older than B.C. 1350; and one, which represented Osiris as the son of the Ammon and Maut of Thebes, (the Jupiter and Hera of the Greeks,) could not be older than B. C. 889. It is manifest that not the least authority is due to any such traditions as these. The Egyptians either did not know the truth, or did not choose to tell the truth, concerning the origin of this city; and we must endeavour to get at it in some other way. Now there are three facts relating to this city of ancient Egypt, none of which can be disputed: i. That

e ii. 15. 4.
f First series, i. ii. 176, note.
g H. N. xxxvi. 20.
h Diodorus Sic. i. 15: cf. i. 97.
i Ibid. i. 45.

it had two names, the name of Thebes and the name of Diospolis—the latter indeed the Greek version of the Egyptian name which we shall consider by and by; ii. That one of these names was older than the other; iii. That this older name was that of Thebes, not that of Diospolis.

It would be sufficient to establish this third fact, that the name of Diospolis is nothing more than the Greek version of the Egyptian name of No-Ammon or Ammon-ei, and therefore could not be older than that of Ammon; which itself as we have seen would not be older than B. C. 889. But to prove this point we need only refer to the testimony of Homer; who has mentioned and described this city under the name of Thebes[k], but not under that of Diospolis: from which distinction every one must allow it to be a reasonable inference that it was still called Thebes in his time, and not yet Diospolis. It is in our power to prove that the latest of his two poems, the Iliad and the Odyssey, is twenty years older at least than the time when this city received the name of Diospolis: so that he could not have known it by any name but that of Thebes.

The ancient name of this city then, the original name, and in every point of view the proper and legitimate name, was Thebes. What then was the meaning of this name? and why was this city of Egypt called Thebes? In answer to this question, we extract the following note from the Einleitung of the chevalier Lepsius[l]. "The monuments," it is there observed, "present only two names for Thebes: viz. Wohnung (town) of Amon, i. e. Διόσπολις, and Ape.t, or with the article prefixed T·ape, i. e. Θήβη; not unfrequently in Greek, in the plural number, Θῆβαι. *Ape* was a kind of sanctuary in which Amoun was honoured: but Ape also (see p.141) was the name of a goddess—who was particularly honoured at Thebes, (called after her name,) where she had a special temple, and was always identified with Netpe the mother of Osiris."

We think it right to cite this note in the words of its author, in order that our readers may see what light the most profound hieroglyphical researches are calculated to throw on such a question as this. For that this Egyptian Apé, with or without the article, can have been the real

k Il. i. 383: Od. Δ. 126. cf. Pliny, H. N. v. 11.

l P. 272. note 2.

etymon of that name of which the Greeks made Θήβη and Θῆβαι, we never can allow. It offends against reason and common sense, to derive Thebé from T·apé, in which there is not a single element the same as in Thebé, except the final e. And it must be false; because it is contrary to the matter of fact: for if Apé at Thebes was only the same as Netpe, the supposed mother of Osiris, it is certain that Thebes was already in existence, and already called by that name, some hundreds of years before the idea of any such person as Netpe could have been conceived by the Egyptians. The name of Thebes was older in Egypt, much older, than Osiris, even as the son of the egg; much more than Osiris, as the pretended son of the Grecian Rhea, under the Egyptian name of Netpe or Apé.

It is a singular thing that it should not have occurred to men, so learned as those who propose this explanation of the name of Egyptian Thebes, that there were many cities of antiquity called by the name of Thebes, (Θήβη or Θῆβαι in Greek,) as well as this Egyptian one; more perhaps than were called by any one name besides. It could not be unknown to those who had read Homer, that he mentions one more at least, besides Egyptian Thebes; Hypoplacian Thebes, or Adramyttean Thebes[m]: and still less could any of them be ignorant of the existence of a city in Greece so called, which makes so distinguished a figure in Greek history as Bœotian Thebes; not to mention Thebæ in Thessaly also. It is evident, on the plainest grounds of analogy, that there can be no true explanation of the name of Thebes in *one* of these instances, which must not be equally applicable to the *rest*. It would be absurd to assume the existence of an *Apè* in each of these cases, who gave name to the city in each instance alike: and yet it would be just as reasonable and just as necessary to suppose that T·apè gave name to Bœotian Thebes as to Egyptian.

The application of this name to Bœotian Thebes will probably throw light on the origin of the name itself; and

[m] Iliad Z 397: 416: A. 366: cf. Scholia ad Iliad i. 366. Stephanus Byz. in Θήβη enumerates nine cities of this name; Bœotian Thebes, Egyptian, Thessalian, Cilician (Hypoplacian), a Thebes in Ionia, near Miletus, a Thebes in Attica, a Thebes in Cataonia, a Thebes in Italy, and a Thebes in Syria. Ptolemy adds another, in Arabia, Geogr. vi. 7, 5.

on what it was always intended to denote. Varro, De Re Rustica[n], speaks of this city as the most ancient in Greece; Etenim vetustissimum oppidum cum sit traditum Græcum, Bœotiæ Thebæ, quod rex Ogyges ædificavit...Thebæ, quæ ante cataclysmon Ogygi conditæ dicuntur, eæ tamen circiter duo millia annorum et centum sunt: which makes it 2100 years old in his time. And he says it derived its name from the nature of the site on which it was built; that is rising ground of some kind[o]: Nec minus oppidi quoque nomen Thebæ indicant antiquiorem esse agrum; quod ab agri genere non a conditore nomen ei est impositum. nam lingua prisca et in Græcia Æoleis Bœotii sine afflatu vocant collis Tebas; et in Sabinis, quo e Græcia venerunt Pelasgi, etiam nunc ita dicunt: cujus vestigium in agro Sabino via Salaria non longe a Reate milliarius clivus appellatur Thebæ.

Now the date which Varro thus assigns to the foundation of Thebes in Bœotia, 2100 years before the date of his work De Re Rustica, approximates sufficiently near to the Scriptural date of the deluge*; and still nearer to that of the dispersion: sufficiently near to warrant the inference that the flood of Ogyges, referred to in this passage, never could have been any thing different from the deluge of Noah, nor consequently Ogyges himself any thing different from the

* Censorinus, De Die Natali, xxi: Varro divided past time into the ἄδηλον, the μυθικὸν, and the ἱστορικόν. The second of these periods he made to extend from the flood of Ogyges to the first Olympiad; and, if the text of Censorinus here is sound, estimated its entire duration at 1600 years. B.C. 776 + 1600 = B. C. 2376, only 28 years more than the Scriptural date of the deluge, B.C. 2348. In a passage from Varro, quoted by Arnobius, v. 161, the interval from the flood of Deucalion to the consular year of Hirtius and Pansa (B. C. 43. U. C. 711.) is stated at less than 2000 years: A diluvio, cujus supra fecimus mentionem, adusque Hirtii consulatum et Pansæ annorum esse millia nondum duo.

The date of Varro's work De Re Rustica, as we may probably shew on a future occasion, was B. C. 35: so that the actual interval from that time to the Scriptural date of the deluge was 2313 years: and if we might read duo millia annorum et ter centum, instead of duo millia annorum et centum, in the passage quoted supra, nothing would be more in conformity to the truth, for the date of the flood of Ogyges, understood to be the same as the deluge of Noah.

[n] Lib. iii. cap. i. § 2. [o] Ibid. § 6.

patriarch Noah. We say this, not because we believe that Bœotian Thebes was founded by Ogyges, (as thus the same with the patriarch Noah,) or before the flood; but in order to shew that Hellenic tradition from the first did always connect Bœotian Thebes with some flood, and that flood the flood of Ogyges; the only catastrophe of the kind, recognised by Grecian tradition, which was capable of answering to the deluge of Scripture; and in reality neither more nor less than the deluge of Scripture itself. Nor can there be any doubt of the fact of this connection. No association is more common in ancient Grecian history than that of Ogyges and Thebes. No epithet is of more frequent occurrence than that of Ogygian applied to Thebes: and one of the seven gates of Thebes, it is well known, from the first bore the name of Ogygian.

On what then was this connection founded? on the matter of fact, or on something else which nevertheless implied a reference to it? Not on the matter of fact; unless Thebes was really older than the flood of Ogyges, and really founded by Ogyges. On what then, distinct from the matter of fact, yet necessarily implying a reference to it, except the name? What could there be to connect Bœotian Thebes with Ogyges and the deluge, distinct from the matter of fact, but the name of Thebes itself?

The real founder of Thebes in Bœotia was Cadmus the Phœnician; and the name of Thebes must have been given it by Cadmus. The meaning of the name therefore is to be sought for, first and properly, in the language of Cadmus; and, if Cadmus came from Phœnicia, his language must have been the Phœnician; and the Phœnician of Cadmus's time, and indeed of any time, was little or nothing different from the Hebrew. Now in the Hebrew the word which the Greek expresses by Θήβη is the name of the *ark*. It is the very word which occurs in Scripture, for the first time, when the ark is first mentioned[p]; and as often afterwards as the ark is alluded to again in the account of the flood. We have no doubt that this is the true explanation of the phenomenon into the cause of which we are inquiring; the imposition of this name of Thebes on so many cities of antiquity, and in so many dif-

[p] Gen. vi. 14.

ferent quarters; and those cities too apparently the oldest of all which had an historical existence, and founded at a time which comes nearest to the date of the deluge itself: when the memory of that catastrophe, and of the means by which the progenitors of the existing race of men every where had been preserved from the common destruction, was still fresh in the minds of their descendants. We have no doubt that in every instance, and every where, this name originally meant "the ark;" and that, wheresoever it was applied to a city of antiquity, it was commemorative of the flood, and of the escape from the flood. And we thus see how naturally and almost how inevitably Bœotian Thebes among the Greeks must be connected, by its very name and from the first, with the deluge of Scripture; which, in the Hellenic tradition relating to that event, was the flood of Ogyges.

It is exceedingly probable that the name of the ark, the Thebè of the Hebrew, the name by which it is designated in Scripture, ran through all languages, even after the confusion of tongues, and after the dispersion; and that its meaning was equally intelligible every where. Nothing was more probable *a priori* than that the first settlers among mankind, and in all parts of the world, would give the name of "the ark," or Thebè, to the first cities which they built for their own protection and security, and for the common purposes of social existence; and to cities built in particular situations—on rising ground—or in the vicinity of waters, yet raised above them, and out of the reach of danger from them. We see nothing improbable in the fact mentioned by Varro that, even in Italy and among the Sabini, the name of Thebæ or Tebæ was applied to hills or eminences generally. Much less improbable is it *a priori* that such a name might be purposely given to some one of the cities of Egypt, a country liable to be flooded and laid under water every year; a country in which the external phenomena even of the deluge of Scripture were exhibited every year; a country in which every town, and every village, raised on an artificial mound or embankment, above the highest level of the inundation, in order to escape from its effects, was isolated by its situation in the midst of the waters, and could be compared to nothing so properly as to an ark like that of Noah.

Θήβη, says Hesychius[q], πόλις Βοιωτίας, καὶ κιβώτιον: from which it might always have been inferred that Θήβη, even in Greek, had the sense of κιβώτιον or ark. To apply however what we have been saying to the case of Egyptian Thebes. The Egyptian king Sesostris, the most famous of all their kings, in Diodorus is mentioned under the name of Sesoosis[r]. He relates of this Sesoosis[s] that he was the first to transplant the cities and villages to artificial mounds and embankments, above the level of the inundation; that is, to make arks such as we have supposed of each of them: and in particular that he built a ship of cedar wood, 280 cubits in length; which he dedicated to what Diodorus calls the principal divinity at Thebes, though he does not style him either Amoun or Jupiter. Now what was the meaning of this ship, the dimensions of which were almost equal to those of the ark, if it was not intended in imitation of the ark? or what had the principal divinity at Thebes, an inland city, seven or eight days' sail up the Nile from the sea, to do with a ship, if his own city itself did not borrow its name from a ship? We learn too from Diodorus and Q. Curtius[t] that, even at the temple of Ammon in Libya, it was usual for the priests at a stated time to carry out his statue in procession, in a *ship*; and this Ammon of Libya, as we shall see by and by, was borrowed from the Ammon of Thebes: and the connection, real or supposed, of the Ammon of Libya with a ship could be ultimately due only to that of the Ammon of Thebes with a ship too. And this is to be explained solely by his connection with his proper city, the name of which denoted a ship.

In a word, when we read in Scripture[u] that the patriarch Joseph, having bought all the land of Egypt for Pharaoh, removed the people into cities from *one* end of the borders of Egypt, even to the *other* end thereof, we must necessarily infer that, if Thebes had never been founded in Egypt until then, it must have been founded at that time; because it is actually almost the extreme or border city of Egypt in

[q] In voce.

[r] i. 53–58.

[s] i. 57. cf. of Thebes in the time of Sesostris, Sesoosis, or Sesonchosis also, Apollonius Rhod. iv. 259 sqq. and the Scholia.

[t] Diodorus Sic. xvii. 50. Q. Curtius, iv. vii. 24.

[u] Genesis xlvii. 20, 21.

that direction: and if it was founded at this time, and by Joseph, every one must allow that a name, denoting the ark, yet taken from the Hebrew language itself, might have been purposely given it, and by the patriarch Joseph too. We are entirely of opinion that it *was* founded in the reign of Sesostris or Sesoosis: but we are also of opinion that if Sesostris had a real existence, if he too was not a phantom king, like those of the monuments in general, (and we are inclined to believe in his existence, because it does not rest on the credit of the monuments only, though the name of Sesostris appears on them also,) he must have been the Pharaoh who was contemporary with Joseph, and with the descent into Egypt. But this is a question which we have no occasion to enter upon at present. We have proposed, we trust, a more rational and satisfactory explanation, to any but a confirmed sceptic, of the name of Thebes, than that which is derived from the hieroglyphical T·apé. We shall conclude with a few words on its other name of Diospolis.

This name would be the literal version of *Wohnung Amon*, or Abode of Amon, in the extract from the Chevalier Lepsius, supra; though sir Gardiner Wilkinson has Hiu-Amoun, Amounei or Amoun, for the Abode of Amoun[u] *. It occurs in Scripture in the form of No-Ammon; ("art thou better than No-Ammon?"[w]) which the Septuagint render by Διόσπολις; though our own translation has rendered it by "populous No," or by "the multitude of No," as if the original meant "No of multitude." It is clear however that such a name never could have been older than the deification of Amoun at Thebes; that is, than B. C. 889, when Amoun-Ra actually be-

* It appears from Mr. Birch's Egyptian Antiquities, part i. p. 4, that this name of the "Abode of Amoun" was given to a kind of shrine, ναὸς or ναΐσκος, in Greek, in the Hieroglyphic, *sheet*, which used to be carried in procession by the priests. Diodorus tells us the νεὼς of Ammon at Thebes, at a stated time every year, was carried across the Nile into Libya, or Æthiopia; i. e. into the desert in that direction: i. 97. In like manner the statue of Ammon of Libya was carried out at stated times.

u First series, i. i. 12; cf. note, p. 176.

w Nahum iii. 8. Cf. Jeremiah xlvi. 25, 26; Ezekiel xxx. 14–16. Cf. Jerome, iii. 912. ad med. in Ezek. xxx: ibid. iii. 125. in Isai. xviii. In both these instances he understands No of Alexandria, per πρόληψιν.

came the tutelary genius of that city. We must conclude that, among the other innovations which signalised this epoch of the correction of the calendar at Thebes, B. C. 889, the change of the name of the city from Thebes, or the city of the Ark, to No-Ammon, the abode of Amoun, *Διόσπολις* in Greek, was one. It is quite consistent with these facts, that no allusion occurs to this name in Scripture, before the time of Nahum; whose prophecy could not have been delivered long before the date of the destruction of Nineveh, to which it relates exclusively; that is, before B. C. 606. And at this time it is alluded to as if it had ceased to exist; or at least was much reduced in grandeur and populousness: and as having in fact, some time or other before the prophecy in question was delivered, been carried into captivity. It is manifest that between B. C. 889 and B. C. 606, an interval of 283 years, various things might befall this city of which we have no account in history. Yet from what Diodorus relates of Amoun and of Sabacos the Ethiopian[x], it could not yet have experienced that reverse of fortune in his time: and as he was the So of Scripture, contemporary with Hoshea, the last king of Israel, and with the first part of the reign of Hezekiah, B. C. 725–720, it could not have suffered any such reverse before B. C. 720. In our opinion the instrument of the Divine Providence, in inflicting this judgment on Thebes or No-Ammon, was Esar-Haddon, the son and successor of Sennacherib, the greatest of the kings of Assyria; and the same who carried Manasseh also captive from Judæa. With regard to the subsequent history of this city, we have nothing to do with it. Cambyses and Ptolemy Lathyrus are both said to have laid it waste; and even Cornelius Gallus, the first Roman governor of Egypt, B. C. 28 or 27[y]. Yet it was still more or less entire when Germanicus Cæsar visited it in A. D. 19[z]; and received from its priests upon the spot the romantic account of its greatness in the reign of Rameses, which Tacitus has recorded.

x i. 65.

y See our Dissertations, App. Diss. xxiii. iv. 499, 500. Strabo, xvii. 1, would give us reason to conjecture this treatment of Thebes was connected with some *στάσις* in the Thebaïd, produced by the discontent of the people under the tribute exacted from them by the Roman government.

z Tacitus, Ann. ii. 60.

SECTION VI.—*On the calendar of the Ammonians, or of the Temple of Hammon, in Libya.*

We are told by Strabo that particular localities in the midst of the deserts of sand on every side of Egypt but the north, which happened to be inhabited, were called by the Egyptians, *αὐάσεις*; from which we have borrowed the word *oasis*, in our language, to denote the same thing: *Αὐάσεις δ' οἱ Αἰγύπτιοι καλοῦσι τὰς οἰκουμένας χώρας περιεχομένας κύκλῳ μεγάλαις ἐρημίαις* [a]. And he specifies three of the kind himself [b]: the first in the direction of Abydus, seven days' journey distant from it; the second in the vicinity of the lake Mœris; the third, in the vicinity of the temple of Ammon, in Libya. Such localities possessed the inestimable benefit of natural supplies of water and shade; and they were consequently green and fertile; exhibiting a singular and striking contrast to the barren and sunburnt expanse of sand by which they were surrounded. In the midst of one of these, the *μακάρων νῆσοι* of the Greeks, the gardens or paradises of the desert, and perhaps the most favoured and beautiful of all, at the distance of ten days' journey from Thebes, according to Herodotus [c], and of twelve from Memphis, according to Pliny [cc], was sometime or other planted the colony of the Ammonians of Libya; so called from Ammon, their principal god, whose temple was built on the same site, and no doubt at the same time.

Ventum erat ad templum Libycis quod gentibus unum
Inculti Garamantes habent. stat certior illic
Jupiter ut memorant; sed non aut fulmina vibrans
Aut similis nostro, sed tortis cornibus Hammon.
Non illic Libycæ posuerunt ditia gentes
Templa: nec Eöis splendent donaria gemmis.
Quamvis Æthiopum populis Arabumque beatis
Gentibus atque Indis unus sit Jupiter Hammon,
Pauper adhuc deus est, nullis violata per ævum
Divitiis delubra tenens: morumque priorum
Numen Romano templum defendit ab auro.
Esse locis superos testatur sylva per omnem
Sola virens Libyen. nam quidquid pulvere sicco

a xvii. 1. Cf. Herod. iii. 26.

b Ibid. Cf. Herod. iii. 26: Pliny, H. N. v. ix. 324: Photius, Cod. 80: Olympiodorus, p. 61. l. 12 sqq.: Ptolemy, Geogr. Lib. iv. cap. v. § 33. 37: 61.

c Herodotus, iv. 181.

cc H. N. v. ix.

Separat ardentem tepida Berenicida Lepti
Ignorat frondes: solus nemus abstulit Hammon.
Silvarum fons caussa loco, qui putria terræ
Adligat et domitas unda connectit harenas.

Lucan, Pharsalia, ix. 511.

The Ammon of Libya was considered by the best informed of the ancients only another name for the same idea; that of the Supreme Being recognised and worshipped under different titles, but in the common relation of "Lord:" which, as we have already explained[d], was first of all applied to the sun.

Βῆλος ἐπ' Εὐφρήταο, Λίβυς κεκλημένος Ἄμμων,
Ἄπις ἔφυς Νειλῷος, Ἄραψ Κρόνος, Ἀσσύριος Ζεύς[e].

Among the Greeks indeed both this Libyan Ammon and the Theban Ammon were regarded as simply impersonations of their own Jupiter: Ἀμμοῦς, ὁ Ζεὺς Ἀριστοτέλει[f]. There was a festival at Athens called Ἀμμῶν, after this Libyan Jupiter, and in honour of him[f]; which Hesychius seems to mean also under the name of Ἀμμαλῶ[g]· ἑορτὴ ἀγομένη Διΐ: and there was a sacred *τριήρης*, called Ἀμμωνὶς or Ἀμμωνιὰς, and classed with the Paralus and Salaminia, which seems to have been used for no other purpose but that of conveying *θεωροὶ* on errands of inquiry to the temple of Jupiter Ammon[h].

This Libyan Jupiter too was always conceived by the Greeks under the form of a ram; at least with the head and horns of a ram: Ἄμμωνα Λίβυες τὸν Δία προσαγορεύουσι καὶ οὕτω τιμῶσι. καὶ ἔστιν αὐτοῦ μαντεῖον ἐν Λιβύῃ. καὶ γὰρ καὶ Φαΐστος ἐν τοῖς Λακεδαιμονίοις ἐπιβάλλων φησί·

Ζεὺς Λιβύης Ἄμμων κερατηφόρε κέκλυθι μαντί[i].

Duxque gregis, dixit, fit Jupiter: unde recurvis
Nunc quoque formatus Libys est cum cornibus Ammon[k].

In the Greek and in the Latin writers we meet with the following account of the origin of this divinity, of his temple, and of his oracle; and also of the form of his statue, or of the manner in which he was represented. i. Liber in India

[d] Dissertation xiv. ch. iii. sect. vii. vol. iii. 98.

[e] Nonnus, xl. 392.

[f] Hesychius, i. 279. [g] Ib. i. 278.

[h] Harpocration, Ἀμμωνίς· ἡ τοῦ Ἄμμωνος ἱερὰ τριήρης· Δείναρχος ἐν τῷ κατὰ Ἱμεραίου; cf. in Θεωρικά. Photius, in Πάραλος· Ταμίαι: and Appendix, 675, 676, where ἀμοριάδα occurs corruptly for ἀμμωνιάδα. Cf. Plutarch, Cimon, xviii.

[i] Scholia ad Pindar. Pythia, iv. 28: Διὸς ἐν Ἄμμωνος. Cf. ad Pythia, ix. 89: Ἵκεο βᾶσσαν τάνδε.

[k] Ovid, Metam. v. 327.

cum aquam quæreret, nec invenisset, subito ex harena aries dicitur exiisse, quo duce Liber cum aquam invenisset, petit ab Jove ut eum in astrorum numerum referret, qui adhuc hodie æquinoctialis aries dicitur. in eo autem loco ubi aquam invenerat templum constituit quod Jovis Hammonis dicitur[l]— Hermippus autem dicit quo tempore Liber Africam obpugnaverit, devenisse cum exercitu in eum locum qui propter multitudinem pulveris Hammodes est adpellatus. itaque cum in maximum periculum devenisset ... aries quidam fortuitu ad milites eorum errans pervenit: quos cum vidisset fuga sibi præsidium paravit. milites autem ... arietem sequi cœperunt usque ad eum locum qui Jovis Hammonis postea templo constituto est adpellatus. quo cum pervenissent, arietem quem consecuti fuerant nusquam invenire potuerunt. sed quod magis his fuerat optandum aquæ magnam copiam in eo loco nacti sunt: corporibusque recuperatis Libero statim nunciaverunt. qui gavisus ad eos fines exercitum deduxit, et Jovis Hammonis templum cum arietinis cornibus simulacro facto constituit. arietem inter sidera figuravit, ita ut cum sol in ejus foret signo omnia nascentia recrearentur, quæ veris tempore confiunt, hac re maxime quod illius fuga Liberi recreavit exercitum[m].

Sed de Ammonis simulacro Leon qui res Ægyptias conscripsit ait: Cum Liber Ægyptum et reliquos fines regno teneret, et omnia primus hominibus ostendisse diceretur, Hammonem quendam ex Africa venisse et pecoris multitudinem ad Liberum adduxisse...itaque pro beneficio ei Liber existimatur agrum dedisse qui est contra Thebas Ægyptias. et qui simulacra faciunt Hammonis capite cornuto instituunt, ut homines memoria teneant eum primum pecus ostendisse. qui autem Libero factum voluerunt assignare, quod non petierit ab Hammone sed ultro ad eum sit adductus, Liberi cornuta simulacra fecerunt, et Arietem memoriæ causa inter sidera fixum dixerunt[m].

ii. Tages sulco emicuit, et ritum statim gentis superumque monstravit. Ammon apparuit cum cornibus arietinis, et vestimento lanitio, ac sitientibus undam fontis exhibuit[n]: (forsan *undecim fontes.*)

iii. Nigidius hunc Arietem dicit ducem et principem esse

[l] Hyginus, Fab. cxxxiii; cf. cclxxv. Aries.
[m] Ibid. Poeticon Astron. Lib. i. xx. [n] Martianus Capella, ii. 39.

signorum zodiaci circuli: immortali autem honore donatum quod cum Liber exercitum in Aphricam duceret, et aquæ inopiam pateretur, subito aries ex arena exivit, et Liberum cum suo exercitu ad aquam perduxit divinitus. hoc facto Liber eum arietem Jovem Ammonem appellavit, eique fanum magnificum fecit eo in loco in quo reperta est aqua. et abest ab Alexandria itinere dierum novem; locus arenosus et serpentium multitudine plenus: et ab arena Ammon (Hammon) est nominatus. præterea Aries dux aquæ immortalis: mutatus et cœli sidera consecutus[o].

Who would suppose, after such circumstantial descriptions to the contrary as these, that there was, after all, no statue, properly to be so called, in the temple of this Ammon of Libya? nothing but a stone, of a peculiar shape! Id quod pro deo colitur, says Q. Curtius, in his account of Alexander's visit to the temple B. C. 331[p], non eamdem effigiem habet quam vulgo diis artifices adcommodaverunt. umbilico maxime similis est habitus, smaragdo et gemmis coagmentatus. hunc cum responsum petitur navigio aurato gestant sacerdotes, multis argenteis pateris ab utroque navigii latere pendentibus[p]. The statue of Ammon then, if statue it could be called, was nothing more than a truncated cone. We believe this simple statement of the fact to be the truth: for we have seen reason to conclude, (as we may probably take occasion to shew on a future opportunity,) that the first mode of representing the sun under a sensible image, which occurred to the minds of men, was by a stone or a pillar of some kind, shaped in the manner described by Curtius. The pyramids and the obelisks of Egypt were only exaggerated expressions of this primitive and universal idea. With regard to the Amoun-Ra of the Thebans in particular, we are told by the Chevalier Bunsen[q] that his symbol was an obelisk. The Theban Ammon was the prototype of the Libyan. There was no difference between them, not even in name: and the

[o] Scholia ad Germanici Cæs. Aratea Phæn. 223: cf. Servius ad Æneid. iv. 196: III. 466: Diodorus Sic. iii. 73.

[p] Lib. iv. cap. vii. 23: cf. Diodorus Sic. xvii. 50: Plutarch, Alexander, xxvi. xxvii.: Arrian, iii. cap. iii. iv.: Strabo, xvii. i.

[q] Book i. sect. vi. A. 369: cf. Birch, Egyptian Antiquities, part i. p. 1.

That the obelisk was sacred to the Egyptian Ammon, whom the Greeks called Jupiter, may be inferred from the following of Theophrastus de Lapidibus, ii. § 24, speaking of the emerald: Ἔστι δὲ σπανία, καὶ τὸ μέγεθος οὐ μεγάλη, πλὴν εἰ πιστεύειν ταῖς ἀναγραφαῖς δεῖ ὑπὲρ τῶν βασιλέων τῶν Αἰγυπτίων· ἔνιοι γάρ φασι κομισθῆναί ποτ' ἐν δώροις παρὰ τοῦ Βαβυλωνίων

one, as we shall see, was just as old as the other. This Libyan Ammon consequently was a type of the sun as much as the Theban: and its relation to the sun is intimated even in the name of the fountain, peculiar to the same locality, and called *aqua solis*, or water of the sun; which Curtius proceeds to describe in the same passage[r].

How then is the common tradition and belief of the Greeks, respecting the horns and the fleece of this Ammon of Libya, to be accounted for? Possibly because of the fable relating to the Theban Ammon himself, which we have already considered; possibly from some confusion of the Libyan Ammon with Noufra-Noum, the ram-headed god of the Egyptians: but most probably because of his connection with the calendar of the Ammonians, like that of the Theban Ammon with the calendar of the Thebans; and because he was a type of the Ram in the heavens, or of the sun in the vernal sign: which would be explained, if the Ammonian calendar too was attached to the vernal sign, or supposed to be so.

With regard to the founder of this temple, which fable attributed to the Liber of the Latins, the Dionysos of the Greeks, or the Osiris of the Egyptians under the name of Dionysos; the truth appears to us to be intimated by the allusion of Virgil in his Æneid to the Hiarbas of Libya, whom he makes a contemporary of Dido, and of the foundation of Carthage. Tradition had delivered this Hiarbas down to Virgil's time not only as the founder of the temple of Hammon, but as the son of the Hammon to whom it was dedicated; and we have met with too many instances of the same kind of representation in other cases, not to understand this last fact to mean that Hiarbas was the person who introduced the worship of this Ammon into Libya.

> Hic Hammone satus rapta Garamantide nympha
> Templa Jovi centum latis inmania regnis
> Centum aras posuit; vigilemque sacraverat ignem,
> Excubias divum æternas[s]—

βασιλέως μῆκος μὲν τετράπηχυν πλάτος δὲ τρίπηχυν. ἀνακεῖσθαι δὲ καὶ ἐν τῷ τοῦ Διὸς ὀβελίσκους σμαράγδου τέτταρας μῆκος μὲν τετταράκοντα πηχῶν, εὖρος δὲ τῇ μὲν τέτταρας τῇ δὲ δύο.

The appearance exhibited by the sun, when rising or setting, and just on the verge of the horizon, owing to the effect of refraction, is that of a truncated cone.

r Lib iv. vii. § 22: cf. Herod. iv. 181: Diodorus, xvii. 50: Arrian, De Expeditione Alex. iii. cap. 4.

s Æneid, iv. 299.

Now, if this Hiarbas was an historical character, and if he was really a contemporary of Dido's, (which we know of no good reason for disbelieving,) then his age may be determined. He was living and probably in his acme at the time of the foundation of Carthage. Among the mysteries of the past, hitherto concealed, but which it has pleased God to bring to light in our time by means of the primitive calendar, one is the date of the foundation of Carthage. The primitive calendar was nowhere more religiously preserved, unchanged and unmodified, than at Carthage. We are able to prove from extant facts that the natalis urbis in the Punic calendar was always attached to Pachon 1 : and we are able to demonstrate by means of that datum, and of others of which we are also in possession, that the city was founded on the 1st of Pachon æra cyclica 3140, November 22 dated from midnight, B. C. 867. This then being the year of the foundation of Carthage, B. C. 867, it is the age of Hiarbas also : and the reader will take notice that it is only 22 years later than the Theban correction B. C. 889.

We learn from the same passage of Virgil, that there was a *vigil ignis*, a perpetual fire, which he calls *Excubias divum æternas*, in the same temple; the institution of Hiarbas also, and as old as the temple itself*. These fires in the temples of antiquity were sometimes kept up by means of lamps, so contrived as to continue burning with one supply of oil from the beginning to the end of the year : and where there was a scarcity of fuel of every kind, (as amidst the desert sands of Libya must have been the case,) they could hardly have been maintained in any other way. It does not appear that

* There was one such fire, (a fire which never went out, and therefore called *πῦρ ἀθάνατον*,) at Delphi, and another at Athens[t] : as also at Rome in the temple of Vesta.

> Ignis inexstinctus templo celatur in illo.
> Effigiem nullam Vesta nec ignis habent.
> Ovid, Fasti, vi. 297[w].

Among the Greeks such fires were maintained in the Prytanea, as peculiarly sacred to Vesta, or Hestia : Scholia ad Pindar. Nemea, xi. 1 : Παῖ Ῥέας : *πρυτανεῖά φησι λαχεῖν τὴν Ἑστίαν, παρόσον αἱ τῶν πολέων ἑστίαι ἐν τοῖς πρυτανείοις ἀφίδρυνται, καὶ τὸ ἱερὸν λεγόμενον πῦρ ἐπὶ τούτων ἀπόκειται.*

t Plutarch, De Ei Delphico : Aristides, xx. : Numa, ix.
w Cf. Plut. Camill. xx. : Dionys. Halicarn. ii. 67, 68 : Florus, i. cap. 2. §. 3.

the sacred candlestick in the temple of Jerusalem was appointed to burn both night and day; and not from evening until morning only, or *all* night: but there were temples in ancient times provided with lamps which burnt continually. Athenæus mentions a lamp[x] presented by Dionysius the younger to the Prytaneum of the Tarentines: *Διονύσιόν φησι τὸν νεώτερον Σικελίας τύραννον Ταραντίνοις εἰς τὸ πρυτανεῖον ἀναθεῖναι λυχνεῖον δυνάμενον καίειν τοσούτους λύχνους ὅσους ὁ τῶν ἡμερῶν ἐστιν ἀριθμὸς εἰς τὸν ἐνιαυτόν*: Pausanias another, in the temple of Minerva in the Acropolis at Athens, the work of Callimachus[y]: *Ἐμπλήσαντες δὲ ἐλαίου τὸν λύχνον τὴν αὐτὴν τοῦ μέλλοντος ἔτους ἀναμένουσιν ἡμέραν. ἔλαιον δὲ ἐκεῖνο τὸν μεταξὺ ἐπαρκεῖ χρόνον τῷ λύχνῳ, καὶ κατὰ τὰ αὐτὰ ἐν ἡμέρᾳ καὶ νυκτὶ φαίνοντι.* Such fires, and such lamps, which never went out, were doubtless intended to be typical of the sun, the inexhaustible source of light and heat; ever burning and never consumed.

Now, as Virgil's testimony implies that there was a fire of this everlasting kind in the temple of the Libyan Ammon, which it would be much more probable *a priori* to suppose to have been maintained from the first in the shape of a lamp which never went out, than in any other way; so it appears from the following passage of Plutarch, De oraculorum defectu, that this was actually the case. The date of this dialogue was midsummer, a little before the Pythian games, *τὰ ἐπὶ Καλλιστράτου*, as he defines them: and consequently its scene was laid at Delphi, where the summer Pythia were always celebrated. In this dialogue one of the speakers was a certain Cleombrotus; recently returned from his travels in Egypt and Africa[z]: *Κλεόμβροτος δὲ ὁ Λακεδαιμόνιος πολλὰ μὲν ἐν Αἰγύπτῳ καὶ περὶ τὴν Τρωγλοδυτικὴν γῆν πεπλανημένος...νεωστὶ δὲ γεγονὼς παρ' Ἄμμωνα, τὰ μὲν ἄλλα τῶν ἐκεῖ δῆλος ἦν μὴ πάνυ τεθαυμακὼς, περὶ δὲ τοῦ λύχνου τοῦ ἀσβέστου διηγεῖτο λόγον ἄξιον σπουδῆς, λεγόμενον ὑπὸ τῶν ἱερέων. ἀεὶ γὰρ ἔλαττον ἀναλίσκειν ἔλαιον ἔτους ἑκάστου. καὶ τοῦτο ποιεῖσθαι τεκμήριον ἐκείνους τῆς τῶν ἐνιαυτῶν ἀνωμαλίας,*

[x] xv. 60.
[y] i. xxvi. 7: cf. Anthologia Græca, i. 218: Callimachus, xxiii.: Plutarch, Sulla, xiii: Dio, Fragm. cxxiv. B. C. 86: Strabo, ix. i.
[z] Cap. ii.

τὸν ἕτερον τοῦ προάγοντος ἀεὶ τῷ χρόνῳ βραδύτερον ποιούσης. εἰκὸς γὰρ ἐλάττονι χρόνῳ τὸ δαπανώμενον ἔλαττον εἶναι[a].

The natural year is a constant quantity; or if it is liable to any variation in comparison of itself, it is so slight, so slow, and so imperceptible, that it never could be detected, nor in any length of time, in the manner which is here supposed. Admitting then the truth of the matter of fact so related, and upon the credit of Plutarch, we do not think it can be explained on any principle but one; viz. That the calendar of the temple of Ammon in Libya was really a Julian calendar, yet nominally a natural one; a calendar attached to a fixed Julian date, which in the first instance had coincided with the mean vernal equinox, or with some other cardinal date in the natural year; and, if the mean Julian year had been absolutely the same thing as the mean natural, must have coincided with it perpetually.

The mean vernal equinox, B. C. 889, at the time of the Theban correction was falling on March 31: in the time of Plutarch, and of his contemporary Cleombrotus, the mean was falling on March 25, the true on March 22, and fast approaching to March 21. There was nine days' difference consequently between the mean vernal equinox of B. C. 889 and the true vernal equinox of Plutarch's time, referred to the fixed date of March 31: and this was a difference which might make itself perceptible even in the manner above described. A supply of oil, which was calculated to last from March 31 in one year to March 31 in the next, must be far from exhausted on March 22. We must admit therefore that even this method of comparison, rude and coarse as it may appear, yet in the lapse of a thousand years, from B. C. 889 to the time of Plutarch, would be competent to detect the inequality of the mean natural and of the mean Julian year. It is not to be supposed that the priests of the temple had no means of finding out that the equinox was already arrived, every year, and yet that the oil in the lamp was not near consumed. We must conclude however that their calendar bore date on a fixed day; and that day originally the mean vernal equinox itself: that the lamp did begin with burning from the vernal equinox in one year to the

[a] Cf. cap. iii.

same natural term in the next, and for a long time did continue to do so. We must suppose too that the mean Julian year was assumed by them as the standard of the mean natural year; and for a long time might have actually appeared to be so: and at this very time, when the lamp itself by continuing to burn so long after the equinox was past had already detected the inequality of the two years, must have been nominally considered so still*.

It appears to us therefore an exceedingly probable supposition that this calendar of the temple of Ammon was altogether the same as the Julian calendar of Egyptian Thebes; and was attached like that in the first instance to March 31 and to the mean vernal equinox: consequently that this too must have borne date B.C. 889, when the first of the equable Thoth was falling on March 31. If the temple was really founded by Hiarbas, it must have been founded before the arrival of Dido, and before the foundation of Carthage, B.C. 867; as Virgil clearly implies that it had been: and B.C. 889 (22 years earlier than B.C. 867) would be altogether suitable for its actual date, as the work of Hiarbas, a contemporary of Dido's, and still comparatively a young man, at the time of the foundation of Carthage itself.

* Cap. iv. of the same dialogue, in answer to the objections of some other of the parties present, Cleombrotus is made to say, Καὶ τὸ μέτρον αὐτὸς εἶδον· πολλὰ γὰρ ἐδείκνυσαν. τὸ δ' ἐπέτειον ἀπέδει τῶν παλαιοτάτων οὐκ ὀλίγον.

This remark confirms the inference in the text. From the vernal equinox to the vernal equinox there could be no sensible difference in the quantity of oil consumed, for ever so long a time; but from the vernal equinox to a fixed term like March 31, on which it was constantly receding at the rate of a day every 129 years, in a thousand years there would be a very perceptible difference; and it might truly be said in the time of Cleombrotus, that the supply annually required had become less and less every year; which is what he means in the observation, τὸ δ' ἐπέτειον ἀπέδει τῶν παλαιοτάτων οὐκ ὀλίγον. This supply is evidently to be understood of the amount of oil necessary to keep the lamp burning from the vernal equinox to the vernal equinox perpetually, in comparison of what it required to be kept burning up to a given fixed term later than that. This supply must have become less and less every year, and in the course of a century almost a day and a night's consumption less than it nad been at first. The priests therefore might well have various measures of the supply to shew a stranger, who came among them; as they appear to have had, if the statement of Plutarch is to be believed.

Now these Ammonians of the temple of Ammon do not appear to have been ever called or known by any other name. They were styled the Ammonians by Sanchoniatho[b]: the books of Taautos, or Thoth, which he professed to have translated, were kept in the archives of these Ammonians. In the opinion of Herodotus[c], they were a colony of the Egyptians of Thebes, and derived their name from the Ammon of Thebes himself; an explanation of their name which every one must allow to be reasonable and well-founded. And though he speaks also of the mixture of Ethiopians with them, and of their dialect as partly Egyptian and partly Ethiopian; this is easily accounted for by the fact that Egypt was repeatedly subject to the Ethiopians, especially Upper Egypt, which was nearest to Ethiopia; and for many years at a time too[d]. And that being the case, Ethiopian settlers might get to be mixed with the Ammonians in Libya, and the Ethiopian language with the Egyptian there. The Ethiopians of Meroë, according to Diodorus[e], claimed the Egyptians themselves as a colony of their own, *Ὀσίριδος ἡγησαμένου τῆς ἀποικίας.*

It is manifest then that the Ammon of the desert of Libya could not pretend to a greater antiquity than the Ammon of Thebes; and yet it is not less clear that, if his worship was really introduced by Hiarbas, and his temple was founded by Hiarbas, the contemporary and suitor of Dido the foundress of Carthage, he could not be content with a less. Hiarbas must have been living and flourishing from B. C. 889—B. C. 867, but not much later. We may most reasonably therefore come to the conclusion that B. C. 889, the date of the correction of the calendar at Thebes, and of the introduction of the worship of Ammon there, and of the change of the name of Thebes to that of No-Ammon, was also the date of the settlement of the colony in the oasis of Libya, called after the Ammonians, and of the foundation of the temple of Ammon on that spot, and of the correction of the primitive calendar there too, in a manner altogether analogous to that at Thebes. It is by all means to be supposed

b Supra, p. 186. Diss. xvii. ch. i. sect. v.

c Supra, page 217.

d Cf. Geographi Minores, i. Agatharchides, De Rubro Mari, 26. Diodorus, iii. 11. Photius, Cod. 250. p. 448. l. 39.

e iii. 3.

that the example and influence, or the power and authority, of so considerable a city as Thebes, which in B. C. 889 was probably in the acme of its wealth and greatness, would cause its calendar to be adopted throughout the Thebaid; and even beyond the sphere of its own dependencies, among the Ethiopians themselves. The monuments exhibit proofs, even at present, (if they could only be depended on[f],) that Amoun-Ra was recognised as the principal divinity at Syouah in Libya, at Elassasif, at Beit Oually, and at Meroë, as well as at Thebes. We have no doubt that the Theban correction was adopted at Elephantine, and at Syene also: and that the Julian principle, once introduced into Thebes and established there, penetrated extensively into Nubia and Ethiopia. It is in our power at least to prove, (and some time or other we hope to prove,) that there must have been a much more ancient correction of the primitive calendar of Ethiopia, than the modern Abyssinian one; to which the names even of the months of the modern calendar were originally adapted, and in which Mascaram, the first month, and at present attached to August 29, must have been attached to some day in March, not later than the 22d or 23d. But we have dwelt sufficiently long on these subjects, and must now pass to others, which it is necessary for us to consider before we can make an end of this part of our work.

[f] Egyptian Antiquities, part i. p. 2.

DISSERTATION XVIII.

Resumption of the subject of the Apis cycle of the Egyptians.

CHAPTER I.

On the two zodiacs of Denderah.

SECTION I.—*Importance of the testimony of these zodiacs to the subjects discussed in the preceding parts of the present work.*

NEXT to the Rosetta stone of which we have already given some account, and which the discovery of the clue to the system of phonetic hieroglyphics, furnished principally by it, has rendered memorable; none of the monuments of ancient Egypt has been considered more important, or has attracted more attention, than the two zodiacs of Denderah, the ancient Tentyra or Tentyris of Upper Egypt, the principal city of the xlviith nome in D'Anville's map of ancient Egypt, the nome called after it νομὸς Τεντυρίτης, the Tentyrite nome; situated, according to the same authority, in 49° 40′ east long. and 26° north lat., and on a flexure or bend of the Nile almost from due north to due west, but on the west side of that river, over against Kainopolis, or the *civitas nova*, on the east side.

These zodiacs are distinguished asunder by the name of the zodiac of the portico and of the zodiac of the cieling respectively: the former consisting of two parallel bands, each of which in its original state contained six signs of the zodiac; the latter a circular planisphere, divisible into two parts, the central containing the zodiac or at least the zodiacal figures, and the margin or border, which is filled with figures also, but not with zodiacal figures. The circular zodiac has been more noticed and more discussed of the two;

partly because it was in a more perfect state, and presented a greater variety of objects which in an astronomical point of view appeared to be of the greatest importance; and partly because it was more accessible, having been removed from Egypt to Paris, and deposited in the Louvre there: though, in reality, for the illustration of the Egyptian sphere in particular, the zodiac of the portico is the more serviceable.

It would answer no useful purpose to revive the controversy to which these zodiacs gave occasion; or to consider the various opinions which have been proposed concerning them. It is the common misfortune of all the inquiries which have been instituted in our time into the monuments of ancient Egypt, especially by the learned and by men of science on the continent, that with very few exceptions they have been instituted either in the spirit of an open and undisguised hostility to Scripture, or with no bias at least in its favour; with no such conviction of the truth of Scripture as might have been expected from those who nominally professed to believe it; with no predisposition to suspect every thing which appeared to be at variance with Scripture, on that very account. In this spirit of reverential submission to the authority of Scripture on all questions, chronological, historical, or astronomical, and with this implicit deference to the simple and literal truth of Scripture, very few have approached to the study of these remains: and, as was naturally to be expected from the contrary temper and prejudice under which they laboured, the boldest, the most extravagant, and certainly the most anti-Scriptural, inferences have been drawn from them; and from none more unhesitatingly and more unscrupulously, than from the monuments of an astronomical character, like these zodiacs of Denderah; in which the chronology and history of ancient Egypt, extravagant in itself and irreconcilable with Scripture as it was, appeared to be attested and confirmed by the infallible evidence of astronomy.

We have no desire to revive the memory of such discussions; not because the truth of Scripture has suffered, or ever was in danger of suffering, even from the wildest and most extravagant speculations of this kind; but because it is a painful and humiliating spectacle not merely to Christians

but even to men, to moral and responsible beings, to see the noblest faculties and the most extraordinary attainments, through the folly and perverseness of their own possessors, abused in a manner the most fatal to themselves and to others; and debased and degraded by being made to labour in the cause of infidelity. It has pleased the providence of God for its own wise purposes to permit this spectacle to be witnessed in particular instances, ever since his truth was first revealed to men; but on a large and indiscriminate scale, approaching almost to the total renunciation of his truth itself, only in *our* time; who are living so much nearer to the end of the world. Nor can any serious and reflecting person, who both knows and believes what Scripture itself has declared on this subject, contemplate this spectacle, and not perceive in it the prelude to that universal apostasy which has been predicted; and which must assuredly happen before all things come to an end.

It is sufficient for our purpose, if we can point out to our readers on what principle this zodiac of the cieling, as it is called, was always bound to have been construed and explained; and if we can confirm that construction by such simple and intelligible arguments as shall leave no reasonable doubt of its truth. To this explanation therefore we shall proceed without further preface. If we succeed in our object, the reader will judge for himself what real foundation there ever was, in the testimony of these two zodiacs at least, for all the extravagance, all the absurdity, and in some instances all the impiety, to which they have ostensibly given occasion: and he may draw *one* salutary inference at least from so memorable an example of the fact itself, that whatsoever difficulties and inconsistencies there may be between the *prima facie* testimony of any of these monuments of antiquity and that of Revelation, it is due to *our own* ignorance of their real meaning, and not to any inconsistency between them and Scripture itself: and that rightly comprehended and rightly explained they will not be found to contradict Scripture in the slightest degree. This is a conviction which we are anxious to impress on the minds of our readers by an unquestionable case of the kind, like that of these zodiacs; for the monuments of ancient Egypt are much too numerous

for us to consider in detail, and to endeavour to find out by actual examination how far each of them is really consistent or inconsistent with Scripture. We have selected these two as a specimen of a large class of such monuments, in which the chronology, the history, the mythology, and the astronomy, of ancient Egypt appear to be all blended together; and one of the most striking specimens of its proper class, and one of the best calculated to illustrate both the use and the abuse of this kind of testimony: its use, when rightly understood and applied; its abuse, when misconstrued and misapplied, especially in confirmation of scepticism, and to the prejudice of revealed truth.

And even if we should not succeed in our object to the satisfaction of our readers at least; still it is but right to remind them, that our conclusions may possibly be wrong on this particular question, and yet the truth of nothing, which has been established in the preceding parts of our work, is reasonably to be considered endangered thereby. The inquiry on which we are about to enter is a purely isolated one; which we might have dispensed with altogether, if we had thought proper to do so. If it leads to that result to which through the blessing of God we trust it will, additional light will be found to be thrown by it on a variety of points, on which it cannot be said that more light is not still wanted, though much has been already done to clear them up: but whether or not, none of the conclusions, which we have hitherto maintained, will be in the slightest degree compromised by the success of the present inquiry. They rest on arguments and proofs of their own, entirely independent of these testimonies: of which, as our readers are aware, we have hitherto made no use, though we have before now alluded to their existence, and to the possible service which they might be found to render us[g].

The first and original drawing of these monuments is that which was made on the spot by the Baron Denon, one of the men of science who accompanied the French expedition to Egypt in 1802. The planisphere of the cieling itself is at present in the Louvre at Paris. But what we propose to take as the text of our remarks on this zodiac is the representa-

[g] Diss. xv. ch. vi. sect. xii. vol. iii. 398.

tion thereof contained in the great work upon Egypt, published by the French government in 1835, under the title of "Monuments de l'Égypte et de la Nubie;" a work which embodies the last fruits of the personal researches of Champollion Le Jeune, and we presume may justly be regarded the most exact and authentic, as it is certainly the most elaborate and complete, production of its kind, which has yet appeared. The plates of this work alone extend to four volumes, and those are the whole of it which has yet been published; though we must suppose that the text or descriptions, which should accompany them, are destined some time or other still to appear. The zodiac of Denderah, the zodiac of the cieling, which we are proposing to consider, is plate cccxlix *bis* in this collection; and is found in volume ivth. The zodiac of the portico does not appear in it at all[h].

SECTION II.—*On the proper construction of the representation on the cieling of the temple of Denderah, in general, and whether it is more properly astronomical or chronological.*

Now this representation on the cieling of the temple of Denderah being divisible into two parts, the interior circle and the exterior border, the former of which only comprehends the zodiac properly so called; the first observation which we have to make upon it is this: That, as these two parts are distinct, they admit of being separately considered; and it will greatly facilitate the right understanding of each, and the ultimate explanation of both, to consider them as distinct, and one as entirely independent of the other.

Secondly, we observe, These two parts being considered as distinct, and the interior circle being regarded as independent of the exterior; if any signs or symbols, different from the zodiacal figures, are to be met with in either, which appear to give the representation an astronomical character, and to refer it in some sense or other to the heavens, they are confined, almost exclusively, to the exterior circle. No signs or symbols of this kind in general, distinct from such figures as represent the signs of the zodiac on the sphere, are

h See the engraving (No. iii.) at the end of the present volume of our own work, which we have had made of the interior circle of this plate; in order that what we have to say concerning the subject of the representation may more easily be understood.

discoverable in any part of this cieling, except those which at first sight would be pronounced to be *stars;* which resemble stars and the outlines of stars, according to the manner in which stars are usually delineated on sculptures or on paintings. These stars, or images of stars, are profusely scattered over the exterior circle; but they are almost entirely excluded from the interior one. *Five* only can be counted there; while upwards of *one hundred* and *forty* may be reckoned in the marginal circle. We are justified therefore in affirming that if any thing of an astronomical character, *prima facie* distinct from the ordinary figures of the zodiac, is discoverable in this whole representation on the cieling, it is confined to the margin or border; it does not extend to the whole, nor even to that part of it which properly comprehends the zodiac.

Thirdly, with respect to these symbols *prima facie* of an astronomical character, confined as they are to the exterior of the representation, yet being of one kind only, symbols or figures externally resembling stars; the question which first suggests itself, and first presses for an answer of some kind, is obviously this, What is the meaning of such figures? And whether they are really intended for stars or not? It seems to have been generally taken for granted, as something so obvious that it scarcely admitted of being called in question, that they were *stars;* that they were intended for stars, and groups of stars, that is, constellations; and therefore in an astronomical point of view that they were the most important parts of the entire representation. Among these stars and groups of stars, thus laid down in this representation, the most remarkable constellations in the heavens, and the most easily and certainly to be recognised, it has been generally supposed, were sure to be found; the discovery of which would be an infallible clue to the age of the representation itself.

Notwithstanding however this very general presumption to the contrary, we do not hesitate to affirm that this astronomical construction of the figures resembling stars, in the exterior border of the zodiac, or even in the interior circle so far as they are discoverable there also, is mistaken. It is the great error of judgment, so to construe and so to explain

them, which has misled the learned hitherto; and has necessarily falsified all their reasonings and all their conclusions concerning this representation in general. We maintain that the stars, so thickly scattered in the outer margin, have no astronomical meaning whatsoever; that they are chronological symbols, and not astronomical; and must be understood and interpreted accordingly. To make this assertion good, to prepare the way, at least, for the proof of its truth at last, we must begin with inquiring into the proper meaning of this symbol, externally resembling a star, when used hieroglyphically.

SECTION III.—*On the meaning of the symbol of a star, used hieroglyphically.*

Phonetic hieroglyphics, or that kind and description of hieroglyphical characters in which the visible symbol stands only as the supposed representative of a certain letter, or of a certain combination of letters; as far as we understand its nature, is nothing but an alphabet of a particular kind. It is one alphabet substituted for another. It is the alphabet, properly so called, represented by an alphabet too; but of a different kind. It is nothing more or less than the alphabet in the form of a cypher, and as it has always appeared to us, a very clumsy, and cumbrous, and inconvenient cypher too; particularly when compared with the simplicity, the completenesss, and the convenience of that which it was intended to supersede, the alphabet properly so called: yet still a cypher, a cypher composed of hieroglyphical characters, but not the less a cypher on that account; since each of these characters must be read and interpreted as equivalent to an ordinary letter of the alphabet, or to an ordinary combination of letters of the alphabet, such as we mean by syllables. It is in this branch of hieroglyphics, that the great modern discoveries have been made, or are supposed to have been made. Dr. Young in this country, and Champolleon Le Jeune in France, have found out the key to the system of Phonetic hieroglyphics; and this has been emphatically called the "great discovery of the age:" whether truly or not—without any disparagement to the ingenuity and to the sagacity which were displayed in making the disco-

very—must be determined, after all, by the fruits of the discovery itself, and by the real utility and the consequent true value of that which it brings to light.

In this system however of phonetic hieroglyphics every thing is artificial; every thing is conventional; every thing is positive. There is no natural, no necessary, no *a priori*, connection between the outward and visible symbol, and the thing signified by it; no more than between the letter a and the sound a, or the syllable ab, and the sound ab. The ancients were not ignorant of this phonetic branch of the hieroglyphic; especially Clemens Alexandrinus, who has clearly described it in the well known passage of his works, relating to the hieroglyphical system of the Egyptians in general[a], under the name and designation of the *κυριολογική*; the proper meaning of which was to be directly or simply expressed by means of the letters of the alphabet, *διὰ τῶν πρώτων στοιχείων*, by substituting for the hieroglyphical symbols the letters and syllables of the alphabet*. This was always a plain description of the phonetic hieroglyphic; and it is clear from the description that Clemens Alexandrinus understood that kind of hieroglyphic †. But besides this, the

* In illustration of this meaning of *τὰ πρῶτα στοιχεῖα*, see supra, p. 187: and Cyril, contra Julianum, vii. 231 D—E. De Mose: *Εὐπόλεμος γοῦν ὁ ἱστορικὸς τοὺς ἐπ' αὐτῷ λόγους συντιθεὶς ἐν τῷ περὶ τῶν ἐν τῇ Ἰουδαίᾳ βασιλέων φησὶν ἐναργῶς Μωσέα δὴ πρῶτον γενέσθαι σοφὸν, καὶ γραμματικὴν τοῖς Ἰουδαίοις παραδοῦναι . . . Φοίνικας δὲ παρ' αὐτῶν κατακτήσασθαί τε τὴν ἐπιστήμην, ἅτε δὴ καὶ ὁμόρους ὄντας Ἰουδαίοις, παραδοῦναι δὲ τοῖς Ἑλλήνων παισὶ, Κάδμου δηλονότι παρ' αὐτοῖς γεγονότος καὶ αὐτὰ δὲ διδάξαντος τὰ πρῶτα στοιχεῖα.*

† The phonetic hieroglyphic too may be that which is described by Pliny in his account of the obelisks at Heliopolis and of the inscriptions on them, H. N. xxxvi. 14. § 1. Primus omnium id instituit Mestes qui in Solis urbe regnabat somnio jussus: hoc ipsum inscriptum in eo. etenim sculpturæ illæ effigiesque quas videmus Ægyptiæ sunt *litteræ*. And also that which is meant by Ammianus Marcellinus, in his account of the same things, xvii. 4. (128): Non enim ut nunc litterarum numerus præstitutus et facilis exprimit quidquid humana mens concipere potest ita prisci quoque scriptitarunt Ægyptii; sed singulæ litteræ singulis nominibus serviebant et verbis; nonnunquam significabant integros sensus: in which last words he describes the symbolic, as further appears from the illustrations which he subjoins.

a Strom. lib. v. cap. iv. § 20. p. 16. l. 32. sqq.

ancients enumerate another kind of the hieroglyphic, much more properly entitled to the name than the phonetic; and in our opinion too, much more ancient, and much more properly to be understood as the hieroglyphic universally attributed by antiquity to the Egyptians, than the phonetic. In the same passage of Clemens Alexandrinus, to which we have just alluded, this is called *συμβολικὴ*, in contradistinction to *κυριολογική*; because it made use of symbols, properly so called, whereas the other did not; unless a positive and conventional sign, which had no connection with the thing signified except what was purely arbitrary and by appointment, could be called a symbol. But a symbol (*σύμβολον* in Greek) implied a natural connection between the sign and the thing signified. A symbol was something from which the thing symbolized might be divined by virtue of the symbol itself. Such at least was the symbolic hieroglyphic described by Clemens Alexandrinus, viz. that which expressed its meaning *διὰ συμβόλων*, and was to be explained and interpreted by means of the connection between such symbols and the things symbolized by them. And though he distinguishes two sorts even of this, the simply symbolical and the allegorical; there was no difference between them in this respect. Both made use of symbols in general; that is, of something from which other things might be divined as from their natural tokens or signs: but the former made use of such symbols taken from sensible, external, and obvious points of resemblance between the symbols and the things symbolized; the latter made use of symbols derived from points of resemblance, not so obvious, though equally real; from points of resemblance which lay beneath the surface of things, which were deeper seated in the nature and constitution of things themselves, or were more widely diffused amidst the relations of one thing to another in general; and which consequently, in contradistinction to the former, might very properly be called tropical, metaphorical, or metaphysical; or as Clemens styles them allegorical.

The simply symbolic hieroglyphic was nothing more than the representation of a sensible object of some kind by its own image or likeness: the representation of *idem per idem;* of any object in external nature, which admitted of being

imitated, by its picture. It is with reason therefore that this species of hieroglyphical symbols, as Clemens explains them, was to be translated, or interpreted, and thereby reduced to simple propriety of speech and representation, *κατὰ μίμησιν* (*κυριολογεῖται κατὰ μίμησιν*) : i. e. on the same principle on which all imitation must be; viz. by means of the likeness itself. For if the sensible object in such cases is known, the imitation of it will be known by means of its resemblance to it, and nothing else; just as when men know the original of a landscape or a portrait, they recognise the picture of it or the portrait at once. On this principle, as Clemens illustrates his own meaning, the solar orbit would at once be seen and understood to be meant for the sun, and the lunar for the moon. Nor can it be denied that signs of this first and simplest and most obvious description enter the vocabulary of phonetic hieroglyphics; but only because even phonetic hieroglyphics, as it would seem, could not dispense with the help of symbols of this kind distinct from their own; and consequently not used as phonetics, but as non-phonetics, yet serving to fix and discriminate a variety of subjects which could not be fixed nor discriminated without them. They constitute in fact the Ideo-graphics of the chevalier Bunsen's list[j]: and individually they are the most numerous class of symbols which have yet been decyphered, or are supposed to have been so.

On this principle then it might be supposed that the representation of a star would stand for a star; just as the picture of the sun stood for the sun: and as this representation occurs so repeatedly on the monuments, more frequently perhaps than any one of a different kind besides, why is it not to be everywhere understood on the same simple and obvious sense of *idem per idem?* The answer to this question is That for some reason or other, and possibly because of the very obviousness of this mode of understanding and construing the symbol, this is precisely that sense and construction thereof in this instance from which the Egyptians appear to have abstained most systematically. They appear to have consecrated this symbol from the first to meanings, derivable indeed from this first and most obvious one, but

j i. App. ii. A. 496–535.

secondary to it; and belonging to the category of tropical or metaphysical, rather than to that of simple symbols.

Among the explanations of the symbol of a star which are given in Horapollo, this simplest and most obvious of all is precisely that which does not occur: Ἀστὴρ παρ' Αἰγυπτίοις *γραφόμενος ποτὲ μὲν θεὸν σημαίνει, ποτὲ δὲ δείλην, ποτὲ δὲ νύκτα, ποτὲ δὲ χρόνον, ποτὲ δὲ ψυχὴν ἀνθρώπου ἄρρενος*[k]—*Θεὸν δὲ ἐγκόσμιον σημαίνοντες, ἢ εἱμαρμένην, ἢ τὸν πέντε ἀριθμὸν, ἀστέρα ζωγραφοῦσι . . . τὸν δὲ πέντε ἀριθμὸν, ἐπειδὴ πλήθους ὄντος ἐν οὐρανῷ πέντε μόνον ἐξ αὐτῶν κινούμενοι τὴν τοῦ κόσμου οἰκονομίαν ἐκτελοῦσι*[l]. And though it is usual at present to undervalue the authority of Horapollo, and to consider his testimony antiquated in comparison of the new lights which have recently broken in upon us; we are decidedly of opinion ourselves that Horapollo has given a truer, a more authentic, a more faithful, and on every principle a better, account of the really ancient and characteristic hieroglyphical system of the Egyptians, than that which has yet been recovered from the monuments, or seems likely to be so. For this, as we have already observed, is nothing but the system of phonetic hieroglyphic, a spurious and hybrid system; the invention in all probability of the priests of upper Egypt, if they did not borrow it from the Ethiopians who laid claim to it as much as they[m]: and originally confined to them; at any events modern and recent in comparison of that older and more genuine system described by Horapollo. The system of Horapollo is that of Diodorus, and Plutarch, and Clemens Alexandrinus, and Porphyry, and Proclus; and of every one of the ancients who has told us any thing concerning the ancient hieroglyphical language of the Egyptians: but not this mongrel and adulterated system of later date, of which *they* appear to have known absolutely nothing, or nothing which they thought it worth while to record.

And yet, on this particular question of the meaning of the symbol of a star, we do not find that there is any real difference between the testimony of Horapollo and that of the monuments themselves. Among the *ideo-graphics* of the chevalier Bunsen, this symbol of a star in the sense of a star does not occur; and if it appears among the *determinatives*,

[k] ii. 1. [l] i. 13. [m] Diodorus, iii. 3.

or those which, by following and accompanying others, determine their meaning which would otherwise be indefinite; it is only in those instances in which such signs as would have a different meaning are thereby determined to mean "sidereal time," "a month," "a fortnight," "an hour," or the like, as much as to signify, "stars," "constellations," &c.[n]

Among the significations enumerated from Horapollo, one was *Time*. A star was a symbol of time: a star had the power of denoting time. Now on what principle could a star possess the power of denoting time in general, if it did not first and properly denote some measure of time in particular? In its capacity of determinative, according to the chevalier Bunsen, it denoted a *month*, a *fortnight*, an *hour*: and what are those but parts of time? But above all, it is to be observed, it had the power of denoting *sidereal time*. Could it then denote "sidereal time," and not denote "the sidereal day?" We have little or no doubt ourselves that one of the first and most proper meanings of this particular symbol, in the language of hieroglyphics, was the proper measure of sidereal time, that is, "the sidereal day;" which the ancient Egyptians well knew to be the absolute measure of time itself: and that its next and most legitimate use and meaning, and second only to this, was to denote the proper measure of solar or noctidiurnal time; that is the solar or natural day.

It is easy to prove, by means of the testimony of the monuments themselves, that both the solar day or noctidiurnal cycle in the complex, and its parts and subdivisions, are capable of being denoted by this emblem; and actually are so denoted in repeated instances.

i. Plate cclxxiv. tome iii. of the great work above referred to, at the modern Biban-El-Molouk, (formerly a dependency of Egyptian Thebes,) and from the Sarcophagus, as it is supposed, of Rhamses IV.; there is a representation of the *twenty-four* hours of day and night; those of the day being personified by twelve male figures, all facing one way in front of a figure which is seated, as if in the act of receiving them, while they are advancing in order, one after another, towards

[n] Book i. App. ii. B. Determinatives, 537, No. 7.

it: and as this figure has the head of the hawk, it is thereby recognised to be that of Ra, or the sun. Those of the night are denoted by twelve female figures, all looking and moving in the opposite direction, towards a figure in the likeness of a crocodile, the tail of which, not the head, is facing them. The crocodile is considered to have been an emblem of darkness or the night. So that these 12 figures, facing the crocodile, are evidently the 12 hours of the night; and the 12 facing the sun are those of the day. Now each of these figures both the male and the female has a star over its head: and that being the case, those stars must stand in each instance for the hours of day and night. It would be a mistake to suppose these stars to be merely symbols and tokens of divinity; though a star, undoubtedly, might be the hieroglyphic of a god: for in that case what would there be in this representation to denote the *hours?* It must be evident that each of these figures, both male and female, has a particular relation to some one of the hours of day and night; and if it is exhibited as divine, it is only as the god or the goddess who presided over that hour of the day or of the night. Under such circumstances, the first and proper meaning of the star must be to denote the *hour;* and through that and only through that the divinity which presided over the hour*.

* For the sake of brevity we think it sufficient to refer only to one of such representations as these at present; but there are many more in the same work on which the same reasoning might be founded: as tome i. pl. xcvii. No. 3; from the isle of Ombos: and in particular tome ii. cxxiii—ccxxviii, from Ed-fou, the ancient Apollinopolis or city of the Egyptian sun, one subject in twelve parts, relating to the several passages and transformations of Ed-fou, (the Apollo of the monuments, the material and visible sun,) in the course of the twelve hours of the day. In this the presiding principles of the hours are goddesses, repeatedly introduced in that capacity; but sometimes with, and sometimes without, stars: which shews that stars were no indispensable badges of their divinity, or not more necessary to mark the principle which presided over the hour, than the hour itself.

On the mode of representing the hours of day and night, see Wilkinson, Manners and Customs, Second series, ii. xiii. 68, 69. In the chevalier Bunsen, book i. sect. vi. B. 411, the name of the goddess of the hours, (of the abstraction supposed to preside over that division of time,) is called *Un:* and her symbol is a star (*Si*) over her head. Cf. 407.

ii. There is a representation in Denon's Egypt[o], taken from the sculptures on the portico of the temple at Denderah; the meaning of which is very intelligible. It is a symbolical delineation of the twelve hours of day and of the twelve of night in conjunction; yet of each as under its proper presiding principle. It is not in a state of perfection, at present, it is true: one of the figures (the first of all, and that of the genius which presided over the first hour of the day) having been partially obliterated. Enough however is left to enable us to comprehend the drift of the whole representation, and to discover the principle on which it proceeded; which in this instance was that of exhibiting only the twelve hours as such, but with two genii attending on each, a male and a female, the male first, as the type of the hour in relation to day, and the female next, as that of the hour in relation to night. In this order do these figures alternate, and succeed each other, throughout this representation; so that originally there must have been 24 in all: and even at present 23 are to be seen in it, and part of the 24th. And in this series of masculine and feminine principles presiding over the hours, the left hand figure takes precedence of that on the right, and represents the hour of day; its fellow next to it the corresponding hour of night[p]: and it is very observable that this left hand or masculine

[o] Pl. lxii. p. 91 of the English edition in fol. 1825.

[p] The reason of this distinction, we apprehend to be the following. If you must follow the course of the hours, you must follow the course of the sun; and if you must follow the course of the sun, you must face the south; for the sun is never to be seen in the north: and if you face the south perpetually, you must have the east on your left hand, and the west on your right hand perpetually. On this principle the hours on the left hand, as being the first to rise with the sun, would naturally take precedence of those on the right, and would naturally be considered the hours of day; those on the right the hours of night.

There is a statement in Plutarch, De Iside et Osiride, xxxii. on which this distinction may throw some light: Καὶ θρῆνός ἐστιν ἱερὸς ἐπὶ τοῦ Κρόνου γενόμενος, θρηνεῖ δὲ τὸν ἐν τοῖς ἀριστέροις γενόμενον μέρεσιν ἐν δὲ τοῖς δεξιοῖς φθειρόμενον. Plutarch himself explains this of the Nile, which rises in the south relatively to Egypt, and is lost in the Mediterranean sea, to the north; telling us at the same time that according to the Egyptians the natural face of the world was the east; in which aspect, and as looking *from* east *towards* the west, the north is the right, the south is the left, side of the world: Αἰγύπτιοι γὰρ οἴονται τὰ μὲν ἑῷα τοῦ κόσμου πρόσωπον εἶναι, τὰ δὲ πρὸς βορρᾶν δεξιὰ τὰ δὲ πρὸς νότον ἀριστερά. This may be very true in itself; but it does not appear to us that the θρῆνος in question had any thing to do with the Nile. It is more probably to be referred to the sun; and to be explained with that reference on the principle just pointed out; that the hours of day (those in which light is born) were emphatically those of the *left*; the hours of night, in which light disappears and is lost, were those of the *right*.

principle, so represented presiding over the 6th hour of day, that is the hour of noon, is the symbolical hawk, the type of Ra or the sun himself. So that, on this principle, the tutelary genius of the sixth hour (noon or mid-day) was the sun himself.

Now each of the female figures in this sculpture has a star over its head, or evidently had one, in its original state; and each of the male ones in like manner, either still has or once must have had, a star over or close to its head also. Yet besides these stars, which thus stood over or close to the heads of these figures, there are other stars between every two of these figures; the relation of which to each other, in point of number, is such that they begin with *one* between the first couple, then pass to *two* between the second, and so on; increasing by unity between every couple, until they amount to 12 at last between the last couple of all. No one can doubt then that, while the stars over the heads of these figures may possibly stand for symbols of their divinity, these stars between them must stand for the hours of day and night in conjunction, i.e. as represented by 12 in all; each one of the 12 standing for a double hour, that of the day and the corresponding one of the night also. The testimony of this sculpture therefore is decisive that, even in the same representation, the same symbol of a star might stand both for the genius which had the charge of one of the hours, and for the hour itself; in which case it can scarcely be questioned that it must first of all have been intended, and first of all used, to denote the hour, and afterwards must have been transferred to the genius or principle which presided over the hour.

iv. The remarkable representation in which the heavens were exhibited under the form of a colossal cow, supported by Hercules Lunus, has been explained[q]. The 26 stars over the back of that cow, and the 13 stars over the head of Hercules Lunus, have been proved to be meant of days. If so the symbol of a star must have possessed the power of denoting a day, just as much as the parts of a day. In fact it is most reasonable to suppose that, if it was capable of denoting the parts of a day, it was so merely because it was

[q] Vol. iii. 348. Diss. xv. ch. v. sect. vii.

capable of denoting a day; so that, among its most natural and legitimate meanings, that of representing days in the complex, or the whole of that interval of duration which we understand by the *νυχθήμερον* or noctidiurnal cycle, must have been one. This point therefore may be considered as placed out of question. It follows that as far as we have yet discovered to the contrary these symbols, which occur so repeatedly in the marginal circle of the zodiac of the cieling of Denderah, cannot consistently be supposed to stand for stars, or groups of stars, but may be so for days: and therefore that they are not to be astronomically explained, but chronologically.

SECTION IV.—*On the reference of the outer representation, or that of the border, of the circular zodiac to the Apis Ritual.*

The next observation which we have to make on this exterior representation is That not only is it to be chronologically and not astronomically explained, but also that the chronological explanation of it itself is to be derived from the Apis ritual. This conclusion, if it can be established, will furnish the clue to the discovery of the meaning of the whole of the representation. And though it cannot be directly established by the *prima facie* evidence of the representation itself, it can be rendered highly probable even by what appears upon that at first sight. There is enough even on the face of the representation, to authorize a very strong presumption beforehand that the whole of the scene exhibited on the exterior circle must have been connected in some manner or other with the Apis ritual; and through that with the Apis cycle and the Apis calendar.

For, in the first place, the bust of the Apis, (a figure, at least, which may very reasonably be supposed intended for the bust of the Apis,) occurs three times, at different points of this exterior circle; and in each instance under such circumstances as to designate and constitute an integral division of the circle; and evidently for no other purpose but that. And, on the last of these occasions, this bust is represented with *four* heads; at least when this figure was entire it must have had four heads, and in the baron Denon's copy of the original it actually has four heads: and two of these look one way, the other two the opposite way. It is

an obvious conjecture that these four heads, so disposed, marked the beginning and the end of one and the same ceremony, all in honour of the Apis itself: and when the whole comes to be reduced to the Apis calendar at last, it actually turns out to be the case, (as we shall see hereafter,) that, while the order of the ceremony begins and sets out from one pair of the heads on this same pedestal, it is terminated at the other; having described the entire circumference of the circular border between them.

ii. The plate, which contains the representation, being contemplated exactly as it lies in the proper volume; the first object which strikes the view is a procession of figures, five in number, the last of which appears to be leading by the horns a calf, which has the solar or lunar disk on its head, whereby it is recognised as sacred to the sun, or to the moon, or to both: and close behind this calf is the Ibis-headed figure, the well known type of the Egyptian Thoth; and next to him, and bringing up the rear, there are eight human figures, naked, and close shaven in every part, all included within the circumference of a large oval or circle, each of them represented kneeling with its hands behind its back, and with its face turned towards the calf, and the procession in front. In other delineations of the circular border, which we have seen, especially that of Denon, these eight figures are exhibited in the attitude of the most profound adoration; though that is not so strikingly expressed in Champollion's copy. There can be no doubt however that they are in the attitude of worshippers even there: and if they are evidently priests, (so many naked and close shaven priests,) and if the procession before them really consisted of a certain number of the gods of the Egyptians themselves, assembled on some such solemn occasion as that of the first recognition of the new Apis; if the calf, which they are conducting some whither or other, was the infant Apis, the type of Osiris in a fresh incarnation of that kind at the beginning of a fresh Apis cycle: we account for all this ceremony, and for all this adoration, at once.

iii. We have collected from Ælian and Diodorus, and other authorities[z], that the birth of the Apis must have fallen out in the third month of the Egyptian calendar, the

[z] Vol. ii. 510. Diss. xiii. ch. ii. sect. ix.

month which was called Athyr; and, as we concluded also, on the first day of the lunar month of Athyr, which in the original type of the Apis cycle, and in the first year of the cycle, necessarily fell on the tenth day of the solar Athyr. It would follow from this coincidence that, if there were any stated ceremonies between this day of the birth of the Apis and the high festival of the Apis calendar itself, the first natales Apidis of the cycle, and especially very near to the tenth of Athyr; we must expect to find them noticed even in such a representation as this, and very soon after its commencement too. Now the Isia was a ceremony of that description. The stated date of the Isia was the 17th of Athyr, only seven days later than the 10th of Athyr: and the Isia was so important a festival, so intimately connected with the worship of Osiris himself, that it is inconceivable but that, if it came within the scope and complex of such a representation as this, from the birth of the Apis to the natales Apidis, it must be recognised in it, and pointed out in some manner or other.

Now, the plate being so disposed that one who is examining it may stand over against the north, the four headed bust of the Apis will be seen to face east and west, two of the heads looking eastward, and two westward. Egypt itself was divided by the Nile into two great halves, an eastern and a western. But we have already pointed out [a] a significant circumstance in the early history of the Apis; viz. that it was kept at Nilopolis, in a cabin or hut; constructed for the purpose and so situated that it should always face the east. This representation then being assumed to set out from the two heads which front to the east, one of the first objects which meet us is the figure of a bull or a cow, bearing between its horns the solar or the lunar disk. In Champollion's delineation this animal is represented as a bull; but in baron Denon's (who was the first to copy this sculpture, and from the original on the spot, and whose accuracy and discrimination in all such respects as these, and his scrupulous attention to the minutiæ of his pictures, have never been called in question) it is distinctly represented as a cow: and we are altogether of opinion that it must have been a cow. Indeed could we only

[a] Vol. ii. 507.

assume, at this stage of our inquiries into the meaning of the representation, that it is to be referred to the Apis ritual and to the beginning of the Apis cycle, there could be no doubt on that point. If this animal were really a bull, it must be the Bull Apis itself: and what possible room could there be for the introduction of the Bull Apis at the beginning of the cycle, and along with the Calf Apis too? and what is more, in the order of representation, *before* the Calf Apis itself? And if this animal is not a cow, where else shall we find in the whole of this representation, in the exterior circle at least, the well known emblem and type of Isis, under which she was worshipped at Tentyra, and in the neighbouring city of Aphroditopolis, in particular, the cow of Athor? These considerations, in our opinion, are decisive that the animal figure, which appears so early in the representation, was always intended of a cow, not of a bull; and in all probability of the type of Isis, the cow of Athor, itself.

Now we are informed by Herodotus, that a cow was wont to be produced in public in Egypt, once in the year, during the stated and solemn lamentations of the Egyptians for one whose name he did not care to mention: but whom all his commentators are agreed to be meant of Osiris—annually bewailed by the Egyptians at the Isia. This cow Herodotus calls the cow of Mycerinus; the cow in which the daughter of Mycerinus was supposed to have been buried; the cow which represented the daughter of Mycerinus. But it corresponded to that which is here represented in the sculpture; both in the sex, and particularly in bearing between its horns, like this too, a solar or a lunar disk: shewing it to be typical of the sun or of the moon, or sacred to the sun or to the moon, or to both. It is conjectured, and with every appearance of probability, that this cow of Mycerinus was really a type of Isis; and neither more nor less than the symbolical cow of Isis, the cow of Athor itself. But whether or not, it is clearly to be collected from Herodotus' testimony that a cow was produced and exhibited at the Isia, answering in all external respects to this cow, which appears so early in this sculpture of Denderah, and just where it might be expected to appear, if this cow had any connection with the Isia, and the representation itself opened within seven

days of the Isia. This coincidence must do much actually to connect the representation with the Apis ritual; and with the stated time in that ritual when proceedings would first begin after the birth of a new Apis, preliminary to the first natales Apidis.

iv. There was a stated interval of time, after the birth of the Apis, during which it was kept at Nilopolis; and at the end of which it was carried down the Nile in a *θαλαμηγὸς ναῦς*, a ship appropriated to the transporting of the mystical *θάλαμος*, from Nilopolis to Memphis, in order to be installed in the Apiëum there. Now, at the head of the procession to which we have already alluded as leading the young Apis somewhere or other, there is the figure of a cynocephalus seated on its haunches in a boat; just as at the end of it, and next to the Apis itself, there was the figure of Thoth, with his ibis-beak, bringing up the rear. The cynocephalus was sacred to Thoth: and as Thoth stood in a peculiar relation to time, especially to lunar time, so did the cynocephalus likewise. It was the type of the lunar month and of the lunar day, and of the 24 hours of the day[b]. In short, as the symbol or token of the stated time of a stated solemnity, especially in such a calendar as the Apis; no emblem could be more appropriate than the cynocephalus, except that of his patron and master, Thoth Lunus himself: and he too is here present, and acts his proper part on the same occasion.

And as to the posture of this cynocephalus, we are informed by Plutarch and Porphyry, that the proper motion which the Egyptians attributed to their divinities was that of sailing in boats; and therefore their proper mode of representing them was as sitting or standing in boats. But though the cynocephalus was one of their sacred animals, we do not know that it was reckoned to be divine like the Apis or the Mneuis. It was consecrated to Thoth, who was undoubtedly divine; and it derived a character of sanctity from that relation: but it was never deified that we know of. If so, this cynocephalus cannot be sitting in the boat on the sculpture at the head of the procession, in the usual acceptation of that symbolical posture in the case of a god, who was moving or preparing to move in the manner of

[b] Horapollo, i. 14, 15, 16.

locomotion peculiar to the gods: but with some other meaning and reference; the nature of which must be collected from the circumstances of the representation, and would be explained at once, if he were supposed to be sitting there, as the future steersman or pilot of the sacred boat, which was destined at the proper time to convey the Apis to Memphis.

v. We learnt from Diodorus that there was an interval of 40 days, after the birth of the Apis, during which it was kept comparatively in seclusion and concealment; and this being the case, the first integral period between the birth of the Apis and the natales would naturally be determined by these 40 days. Now if any one will count the stars which occur in the exterior circle between the four-headed bust, where we have supposed the course of proceedings to begin, and the first of the single-headed busts, the place of which on the representation is next to the boat of the cynocephalus; he will find that they are 49 in number: and if some nine of these may be supposed to make no part of the continuous reckoning of the interval, but to have a meaning and use of their own, restricted to particular days between these extremes; then the whole number of these stars will be reduced to 40, the exact number of days specified by Diodorus, between the birth of the Apis and his first public recognition. And, on this principle, if the busts of the Apis were really intended to discriminate the principal stages in the economy of the representation, we cannot be surprised to find the first of them placed where it is, just at the end of the first 40 days.

In like manner we have collected from Ælian, that the entire interval from the birth of the Apis on the luna prima of Athyr, to the beginning of the natales on the luna octava of Phamenoth, was 125 days; which he called four months. If any one will be at the pains of counting the stars, from the two heads facing the east to the two heads facing the west, that is, all round the exterior circle of the zodiac; he will find that there are 147 in all: and if 22 of these may be set aside, for the same reason as before, then the entire number will amount to 125: which, at the rate of one star for one day, would be the exact interval from the luna prima of Athyr to the luna octava of Phamenoth, or

from the 10th of the solar Athyr to the 15th of the solar Phamenoth: on which day, as we have already seen, the natales Apidis, in the first type of the Apis cycle and in the first year of the cycle, always began.

These several coincidences, in our opinion, are strong grounds of probability that the clue to the explanation of this whole representation is really to be found in the Apis ritual and in the Apis calendar: and these are by no means all which might yet be pointed out. But these are sufficient for our present purpose; which is merely to establish such a probability as this *a priori*, before we proceed to substantiate it by particular proofs. We must now pass to those proofs: but first of all, it is necessary to determine, if possible, the precise point in the calendar at which the representation is to be supposed to begin. And for that purpose something will require to be said, by way of preliminary, concerning the hieroglyphical mode of denoting numbers.

Section V.—*On the hieroglyphical notation of numbers.*

The hieroglyphical characters for numbers are exhibited in the chevalier Bunsen's lists of such signs and symbols in general[c]; and in the xixth plate, designed to accompany and illustrate "The Manners and Customs of the Ancient Egyptians" of sir Gardiner Wilkinson, both the first and second series: in which there is a full and particular representation of all the numerical signs, (hieroglyphic, hieratic, and enchorial,) which have hitherto been decyphered. With the two latter we have nothing to do at present; nor even with the former, except so far as concerns the mode of representing numbers from 1 to 10.

Now it appears that the hieroglyphic has only two really distinct characters for these numbers, from 1 to 10. i. A straight line, commonly vertical, or perpendicular to the horizon, rarely, though sometimes, parallel to it, represents unity. ii. The repetition or combination of these lines, sometimes side by side or in parallel rows, sometimes one under another, just as is most convenient, represents the numbers from 1 to 9 inclusive. For one of these numbers only, the

[c] i. 534. App. ii. B. Ideographics, No. 594, 595, 596. App. ii. E. Numerals, p. 590, 591.

number 5, there is a distinct and peculiar character, according to sir Gardiner Wilkinson; that of a star: agreeably to the statement of Horapollo, already noticed by us, from which we learnt that a star had the power of denoting the number five. iii. The number 10 is represented by two of these vertical lines, which set out at first parallel to each other, and proceed for a time parallel to each other, but then make a bend or curve, so as to meet and to form both together a figure in the shape of an horseshoe. This we say is the hieroglyphical character of the δεκὰς or ten; two lines parallel for a time and then meeting in a curve: and such is the hieroglyphical symbol for the μονὰς or unity, a simple vertical line. And it is manifest that, with the exception of the sign for the number 5, taken from the stars, these are the only two modes of representing numbers hieroglyphically which are distinct—if even these can be considered distinct. For it is evident that the first idea of both these representations must have been taken from the human hand; that of unity, and of the numbers below ten, from the fingers; which in their natural position are so many vertical lines, parallel to each other and perpendicular to the horizon: and that of ten, which is only a variation of these lines, from the hands doubled and joined together, (that is, from the two fists,) in which position they present very much in outline the form and appearance of this hieroglyphical mode of denoting ten; two lines, parallel apparently at first, yet bending inwards as they are extended, and meeting in a curve at last.

These short and straight vertical lines, the representatives of unity, and their various configurations, may be discovered repeatedly on the monuments; and perhaps no symbols in the hieroglyphical character can be said to have been better ascertained than these. Yet notwithstanding this fact, and without any the least impeachment of its truth, a careful inspection of the monuments, and particularly of the great work of Champollion Le Jeune, published by the French government, will give us reason to conclude that there must also have been another mode of characterising numbers from 1 to 10; altogether different from this, yet not incompatible with it: the traces of which may be discovered even on monuments the antiquity of which has been considered very great;

but more frequently on those of a confessedly later period, the Ptolemaïc or the Roman æra in Egypt. And these are precisely those periods with which, in our explanation of these zodiacs of Denderah, as we shall probably see hereafter, we have most to do.

But before we proceed to explain what this is, we must first quote the following passage from Horapollo[d]: *Μητέρα δὲ γράφοντες ... ἢ δραχμὰς δύο ... γῦπα ζωγραφοῦσι· ... δραχμὰς δὲ δύο διότι παρ᾽ Αἰγυπτίοις μονάς εἰσιν αἱ δύο γραμμαί· μονὰς δὲ παντὸς ἀριθμοῦ γένεσις· εὐλόγως οὖν δύο δραχμὰς βουλόμενοι δηλῶσαι γῦπα γράφουσιν, ἐπειδὴ μήτηρ δοκεῖ καὶ γένεσις εἶναι καθάπερ καὶ ἡ μονάς.*

In this passage it must be evident from the context that *δραχμὰς*, where it occurs, is a corruption of the true reading, *γραμμάς*: nor do we scruple to correct it by *γραμμὰς*, and to understand it of *γραμμὰς*, in each of these instances.

We learn therefore from this testimony, that unity was represented, among the Egyptians, by two lines. If so, not by the hieroglyphical symbol of *one* line; for one line could never be confounded with two. The question is then by two lines how represented? and how disposed relatively to each other? By two parallel lines? or by two lines not parallel? Certainly not by two parallel lines; because they could never meet, and two lines which never met could never be the representative of unity. Consequently, by two lines not parallel, and therefore inclined to one another, and so far capable of meeting.

But by lines merely inclined to each other, and capable of meeting? or by lines which actually met? The reason of the thing requires, by two lines which actually met: for lines which were merely inclined to one another, yet did not actually meet, could no more represent unity than two parallel lines. Now even *two* distinct lines, meeting in a point, and thereby becoming or seeming to become *one*, might be assumed to be the representative of unity; because, though unity or monad in itself is essentially one, and incapable of division, it is the foundation of all other numbers, which are only this monad repeated, to whatsoever extent they may

d i. 11.

proceed. And the first such number, distinct from unity, yet derived from unity, is of course the number two. And this first number, the product of monad, would be properly represented by two lines diverging from the same point. And unity on the other hand, into which all other numbers must be resolvable at last, would be properly symbolized by two lines, (the least combination greater than unity which is possible,) converging upon and meeting in a common point. Such appears to have been the foundation of this peculiar idea, by virtue of which two lines, meeting in an angle, seemed to be only an appropriate representation of unity: and it both confirms the correction of the text of Horapollo, above proposed, and illustrates the truth of the statement itself, contained in it.

Now, if we examine the sculptures contained in the work to which we have so often referred, or in other works of the same kind, bearing in mind this statement of Horapollo's, we shall often be struck by a singular combination of characters, which we cannot better describe than as an oval, serving as the apex of a wedge or triangle; from which, as the common centre, three lines or rows of characters may be seen to diverge; each of which, on inspection, is found to consist of two such γραμμαὶ as those which Horapollo described; inclined to one another, and actually meeting in an angle or point. Sometimes, (but very rarely,) these lines are seen to be joined by a line parallel to the horizon, so as to form all together a perfect triangle; but most commonly they are merely two lines, meeting in an angle. These angles are so represented as all to point in one direction; and that the direction of the circle or oval at the apex: and all to be included, apparently, one in another, as if each emanated from the other, or each converged on the other: the further from the apex on the nearer to it. In general, we meet with three rows of such angles, all converging on the oval at the apex, and no more: and sometimes the number of angles in each row is the same, sometimes it is different, according to circumstances. These combinations of lines and of angles we will call wedges; understanding however the term in the sense in which we have explained it.

The baron Denon, in his description of the plates and representations contained in his Egypt [e], had frequent occasion to notice these wedges; which, he says, he met with repeatedly, and under such circumstances as left no doubt on *his* mind that they were intended of the admission of the solar light; or of the solar orb in the act of shedding and diffusing its light. And it must be acknowledged that this particular symbol occurs in the chevalier Bunsen's list [f], with the same explanation of the sun's disk diffusing rays, or the sun's disk shining. On this principle, the circle or oval, at the apex of these wedges, would stand for the sun; the rows of angles beneath, diverging from it, for streams or rays of light, issuing from the sun.

We shall not venture to contradict so high an authority on the subject of hieroglyphics (the hieroglyphics of the monuments) as the chevalier Bunsen, or Mr. Birch; and therefore we shall freely admit that this explanation of the symbol, under some circumstances, may be just and true: though with regard to the cases more particularly referred to by the baron Denon, we consider it very possible that what he concluded to be always intended for the sun, and the emission of solar light, might really be only a particular mode of representing the hours of the day [g]. But be this as it may; it is agreed upon all hands that the same hieroglyphical symbol is capable of various significations, so that the same combination of characters might mean one thing under certain circumstances, and something very different under others; and no meaning could be said to be excluded from the scope and comprehension of a particular combination, which was only natural and appropriate to the circumstances under which it was found. And yet it may justly be contended that to construe this particular symbol, in this particular way, is to make it *a priori* improbable, and contrary to what was naturally to be expected. We have, it is true, the sun's disk as the source of light; and we have certain lines, supposed to be streams of light, issuing from it. But how has it hap-

[e] Pl. lvi. No. 7: Tentyra. p. 64. Ibid. lvii. No. 1: Edfou or Apollinopolis, p. 65.

[f] i. App. ii. B. 537: Determinatives, No. 7. App. ii. 576: Phonetics, G. No. 1.

[g] Cf. Pl. xlvii. No. 7. pag. 53 &c.

pened that these streams should be neither more nor less than three in number? and that all three should converge on one point, or all three should diverge from one point, of the solar orb itself? And how has it happened that this point is always at the bottom of the solar disk? Is the power of diffusing light confined to any one point of the solar orb? Can it not emanate from the centre and top and sides, as well as from the bottom? Was it thus that the ancient Egyptians observed, and copied from, nature? When modern artists represent the sun in the act of shining, it is by means of rays diverging from all parts of its circumference alike: and such disks, from which rays are actually diverging at every point, may be seen on the monuments themselves[h].

How has it happened too, we may ask, that these streams of light have been so invariably represented by lines and angles, one within another, it is true; but still numerically and individually distinct? Is it thus that light is propagated from the sun, or that the continuous and uninterrupted motion of a fluid of any kind would naturally be expressed? Water, it is well known, is hieroglyphically represented by continuous, though wavy and zigzag, lines: and one of the very first symbols of the ideographic class, which occurs in the chevalier Bunsen's list[i], the hieroglyphical expression for a shower of rain, is of this description; wavy or zigzag, but still continuous, lines descending perpendicularly from a vault or canopy over head. It must be allowed that there is some force in these objections; and that the common explanation of the wedge-shaped combinations of similar characters, which makes them the signs of streams of light, radiated from the sun, is *a priori* improbable, because unnatural. But whether or not, if it is still admitted that the very same representation may have very different meanings, according to circumstances; we are not concerned with the truth or the falsehood of this particular explanation; and if our readers think proper, it may be received on the authority of those who propose it.

Let us proceed then to inquire whether this combination of

[h] Monuments de l'Égypte et de la Nubie, tome iv. Pl. cccxvii. B. 2nd line or row, Thèbes or Karnak. Cf. Denon's Egypt, Pl. lxiii. No. 3. p. 74. Tentyra. A solar disk, on the prow of a sacred boat, streaming with rays on every side.

[i] i. 497. No. 2.

characters may not have a different meaning; and simply a numerical one.

i. Then, in order to illustrate the possible numerical value of this combination, we begin with referring to Pl. lxxiv. of tome i of the French work in question, which is from the temple of Osiris at Dandour; and to figure 5 in that plate, the representation of some divinity, which from its head-dress, surmounted by the solar orb, and from the style and character of the figure in general, (Grecian or Roman as much as Egyptian,) may most reasonably be supposed intended for the sun: but as combining in the same person both the Egyptian and the Grecian idea of the sun.

On the head-dress of this figure there are three of these rows of angles; the two outermost of which contain 16 each, the middle one 15, and all three 47. The skull-cap is covered with the same kind of angles also; but the figure being exhibited in profile, we see of course only *half* of the number which must be supposed to be contained upon it in all. There is a collar about the breast, similarly decorated; of which too we see only one half: and there is a chain about the neck, (of which half only, in like manner, is visible,) consisting of 8 beads or small circles.

Now if this figure was meant for the sun, and these lines meeting in angles really possessed the power of denoting units; it is an obvious conjecture that the person of this divinity was covered with them in this manner, in order to express his relation to the year: and consequently that these angles all together were intended to be equal in number to the days of the year. Let us therefore sum them up as carefully as we can: premising however that, as we see only half the figure, whatsoever be the number of these units in that half, we must double it, to get the number of the whole.

We find then on the skull cap, 129 = 128	=	128
About the neck	.. ..	8
About the breast	.. ..	23
	In all	159
		2
		318
Add, on the head-dress,	.. .. ..	47
Sum total, on the entire figure,	.. ..	365

The number of angles indeed which may be counted on the cap is actually 129: and we cannot say for certain, whether this is one too many, or whether the number of days, which it was really intended to represent in this manner, was the number in the equable year, or in the perfect Julian year, which is of course 366. This one angle in excess however has evidently the appearance of being introduced for a particular purpose; and as the representation comes from Upper Egypt, where the Julian year was well known and even in use, it is far from improbable that the sun in this instance was the type of the Julian year. On the other hand, it is a remarkable circumstance that there should be two rows of 16 angles on the head-dress, and one of 15; instead of three of 16 each. This must have been purposely so ordered, in order to make up the sum of 47, the complement of 318 on 365.

ii. There is a plate from the isle of Ombos[k], in which two female figures are represented, each with a star over its head; and in the rest of the tablet, to which this belongs, there are several similar figures: all which are supposed to denote the principles which presided over the hours of the day and the night. In an oval, over these two figures, facing the right, there is one of the wedges; with *eight* angles in each of the outermost rows, and *seven* in the middle one: and these with the circle or oval, in which all meet at the apex, would just make up 24. We know not what this wedge can stand for here, except the 24 hours of day and night; particularly as there is scarcely any thing else discoverable in or about the oval besides.

iii. There is another figure in this representation, supposed to be that of Ptolemy Euergetes II, attended by his queen Cleopatra, and presenting to some divinity a figure of the Egyptian Thmei, Justice or Themis.

Concerning this Ptolemy, it is to be observed that he was the second surnamed Euergetes; and though in the canon of kings he has only 29 years, and Philometor his brother only 35, both together have 64: and it appears from Porphyry[l], that this Ptolemy having been first associated with his

[k] Tome i. xcvii. No. 3.
[l] Apud Eusebium, Chron. Arm. Lat. Pars i. 238–241.

brother in the *eleventh* year of his reign, (25 years before his death,) chose to reckon his own reign from that association, when he succeeded him after his death. On which principle he claimed to himself 54 years; though the canon allows him only 29.

Now in connection with the name of this Ptolemy, and on this sculpture from the isle of Ombos, we have one of our wedges; composed of the circular apex, and of three converging lines of four angles each = 12 + 1 or 13 in all. And these are enclosed between two figures, resembling two flagstaffs, or two hatchets standing erect on the handles, and with the blades facing each other. For the meaning of these symbols, and so disposed, we have searched in vain in the published lists of hieroglyphics; though we find the hatchet among the other mixed signs[m] in the sense of a god. We conjecture that, in this particular combination with the wedge, it stands for the δεκὰς or 10: and repeated for 20. On this principle, this part of the representation will record its date; the 33rd of the Ptolemy in question: a date incompatible indeed with the length of his reign dated from his brother's death, but not as reckoned, according to his own rule, from his association.

Horapollo has the following statement respecting the manner of representing ten[n]: Γραμμὴ ὀρθὴ μία ἅμα γραμμῇ ἐπικεκαμμένῃ (η) δέκα γραμμὰς ἐπιπέδους σημαίνουσι (lege σημαίνει): the meaning of which appears to be that one vertical line, having another line inclined to it, was capable of representing *ten* lines parallel to the horizon. There is no numeral hieroglyphic which answers to this description. The character for 10 in the Hieratic notation comes nearest to it, being an oblique line with another inclined to it[o]. It seems however that a single vertical line, along with another inclined to it yet not cutting or crossing it, and possibly even at right angles to it, (for ἐπικεκαμμένη may mean even that,) had the power of denoting *ten:* and the symbols which we have just described do seem to have been originated in some such idea*.

* These symbols, enclosing such wedges as we have described, occur

[m] Bunsen, B. i. App. ii. D. 587. No. 28. [n] ii. 30.
[o] Manners and Customs, plate xix.

SECTION VI.—*On the application of the above conclusions to the characters of the circular zodiac.*

Beginning of the representation.

It is the drift of the preceding observations to prepare the way for an important discovery; which will serve as the key

more frequently in connection with this Ptolemy and Cleopatra his wife, (so far at least as we have observed,) than under any other circumstances. Turn for example to tome i. pl. lvi. no. 3 and 4 of the French work: which are representations from the pronaos of the temple of Thoth at Ghirsché, Dandour, Dakkéh; both in the reign of this Ptolemy, and both with inscriptions in honour of him. On these the symbols in question occur twice. In each there is the same kind of wedge, between the same two hatchets; and each of these wedges, read as numerical, makes up the same number, 21; but one by the combination of $6+6+8+0=21$: the other by that of $7+6+7+0=21$ too.

Now this is something remarkable; and must do much to confirm the construction which we contend ought to be put on these symbols. For, as both these wedges are found on the same occasion, and both relate to the same occasion; there is every reason to suppose they must mean the same thing: which they do, if read as numbers; yet with the observable distinction of making up the same total by means of different parts or items. In each of these instances then the wedge $=21$, along with the two hatchets, $=20$, would make up the number 41: and this would be the year of the reign of Ptolemy intended by them: a year of his reign perfectly admissible, if he is to be supposed to have reigned 54 years in all.

There is a similar representation from Philæ, (tom. i. pl. lxxxiii. no. 4.) in which this same king, the second Euergetes, attended by his two wives of the name of Cleopatra, is presenting to Isis the symbol of Egypt: and over his figure there is a cartouche or oval, containing the same combination of the hatchets and the wedge, which, read as numerical, is equivalent to $10+13+10$, or 33: that is, to the 33d year of his reign.

There is another, also from Philæ (tome i. pl. lxxxv. no. 1.), with the head or bust of this same Ptolemy, and an oval, enclosing exactly the same symbols; which, read as before, make up the sum of $10+(6+5+5+1$ or $17)+10=37$; the 37th year of his reign.

There is another also from Philæ, (tome i. pl. xci. 4.) of the same Ptolemy striking a prostrate foe in the presence of the god Aroëris; and here too is an oval, with exactly the same kind of symbols, which read as numbers make up $10+(5+5+5+1)+10=36$; the 36th year of his reign.

We may refer also to tome i. xcix. 4: the dedicatory inscription on the pronaos of the great temple at Ombos, in the reign of this same Ptolemy; wherein the same symbols occur, making up the number 48; and a distinct combination of the wedge by itself, (No. 5,) making up the number 31. For particular instances of the wedge, without any other accompani-

to the interpretation of the whole of the outer border of the zodiac.

For having once seen reason to conclude that this com-

ment, we refer to i. xcvi. 2, from the isle of Philæ: xcvii. 4, from Ombos: tome ii. ci. 5, from Ombos also: cxxiii. no. 1: cxxvii. no. 1: cxxviii. no. 2: cxxix: cxxx. no. 1. 3: cxxxix bis. 4: all from Edfou or Apollinopolis, and apparently of the time of the earlier Ptolemies: ccxlv.quater, no. 1. 4. from Esné, of the Roman æra.

And though these examples of the use of these symbols would seem to make this mode of denoting numbers (if such is their meaning) a characteristic of the Ptolemaïc or of the Roman æra; yet wedges or nuclei, such as we have described, appear on monuments undoubtedly more ancient than either of those æras, whatsoever their real antiquity may be: as in the temple of Eileithuia, of the xviiith dynasty, (tome ii. cxlv. 4). At Medinet Habou, contemporary with Rhamsès Mëiamoun, (tome iii. ccxviii.) and at Djébel Selséleh, the ancient Silsilis, contemporary with the xxth dynasty, (tome ii. cxvii.) we find the symbol of the hatchet in combination with three parallel rows of five *horizontal* lines each.

It is observable also that in one of these representations from Dakkéh (i. pl. lxxiv. no. 2.) the Ethiopian king Ergamenes, as it is supposed, (a contemporary of Ptolemy Philadelphus, according to Chevalier Bunsen, book i. p. 394,) is exhibited performing some act of worship in presence of a local divinity, (not known,) who is seated; and behind this divinity, in a vertical row, there are seven nuclei, composed of the circle at the apex, as in every other instance of the same kind, but instead of angles or triangles also, as in the other cases, of still smaller circles or globules, similarly arranged, five in a row; fifteen in all, exclusive of the circle at the apex, in each instance: consequently $\overline{15 \times 7} + 7$ or 112 in all. We will not undertake to say what the meaning of these characters here is. But we are decidedly of opinion that not only the angle, composed of the lines meeting, but the circle, or sphere, or oval, was capable of standing for unity—and not only for unity, but for the number ten. It is clear, we think, in those cases, in which this oval stands at the apex of a converging or diverging series of the angles denoting unity, that it must be the representative of monad or unity itself; out of which all numbers besides proceed, and into which all numbers besides are resolved at last. The circle, sphere, or oval, was the most appropriate type of that which had neither beginning nor end; and such is the metaphysical conception of monad or unity. It has nothing prior to itself; and nothing beyond itself. The circle, for the same reason, might be the type of any thing which was both an end and a beginning; as monad or unity also was: all numbers beginning from it, and all numbers ending in it.

Sir Gardiner Wilkinson observes (Second series, i. xii. 197, 198) that the Pythagoreans regarded *nine* as the closing or final number, beyond which there ceased to be any further progression in the same way. The dekas, or number 10, then was a new beginning; the head of a fresh series of

bination of the circular apex with the wedge, not only from the reason of things or the nature of the characters themselves, but from the analogy of similar combinations on other monuments, may be supposed to stand for a certain number of units; we have only to inspect the representation on the outer border, beginning at the east end of the four-headed bust, to see that one of these combinations occurs at the very commencement of the representation, if supposed to set out from that point; and another at a little distance from it. In each of these instances, the characters consist of the oval at the apex, and of three rows of angles, converging upon it as their centre; and each of these rows contains three angles: so that each of them read numerically is equivalent to $3+3+3+1=10$. In the second of these instances indeed the characters have suffered from the effects of time; but still they are not illegible; they may be made out: and it is manifest that in their original state they must have been such as we have described. This fact is still more unquestionable of the first group of the same kind, which was originally represented in larger characters than the other. In this the characters stand forth prominently, and are distinctly legible, as three rows of wedges containing three angles or triangles each; surmounted by an oval, forming the apex in which they meet. Under such circumstances, if it has any numerical meaning at all, it must be that of the number 10.

The position of this first wedge is remarkable. It stands

numbers of its own kind. In this point of view it corresponded to monad or unity itself. And in this point of view the symbol of the monas would be just as appropriate to the dekas also. There cannot be any doubt at least that, next to monad, (the ultimate abstraction of all number,) the most perfect numerical abstraction was considered to be the dekas, or ten. And the circle or oval or sphere being the most perfect of figures, it was capable of standing symbolically for any thing the most perfect of its kind; and therefore not only for the monas, but also for the dekas.

We might refer the reader to what may be probably considered a clear case of the use of the angle and of its combinations, in the sense of unity, supplied by the representation which we described and explained vol. iii. p. 352. We had fourteen such angles, in one of these instances, and twelve in the other; the former meaning fourteen days, and the latter twelve, and both together denoting 26, the sum total of lunar lights in the Apis calendar month at the epoch of that representation B. C. 848. See also p. 356, 357.

at the beginning of the representation, supposed to be setting out from the east end of the four-headed bust; just over the head of the figure which is the first to be delineated in the order of the representation, and just on the verge of the outer border and of the interior circle itself; consequently in the fittest place to mark and point out the proper beginning of a series of representations, setting out from that point and confined to this border exclusively. It is observable too that, immediately over this first wedge, there is a large circle; and in this circle a figure, as large as life, the left hand of which is holding some animal by the hind leg: which animal is very plainly intended for a pig; and the figure represented as holding it is just as plainly that of a priest. It is therefore the representation of a pig, as sacrificed or about to be sacrificed by one of the priests. Now the pig, as we shall see hereafter, was never sacrificed by the Egyptians except at the full of the moon: and both this pig, and the priest who must be supposed to be preparing to sacrifice it, are enclosed in a circular disk; which would be abundantly capable of representing the full of the moon. It would therefore be an obvious construction of this part of the representation, that it had some reference to the full of the moon: it might be symbolical of the full of the moon. This sacrifice of a pig by a priest might be the hieroglyphical mode of denoting the full of the moon.

Having then made it appear that, according to every presumption of the nature of this representation of the border, which could be conceived from its own evidence, it was more likely to have a special reference to the Apis ritual and to the Apis calendar than to any thing else; and having already ascertained, on other and independent grounds, that if such was the end and design of the representation it must begin in the Egyptian month Athyr, and either on, or immediately after, the 10th of Athyr, the stated date of the birth of the Apis itself: and having also seen reason to conclude, both from the nature of things and from the analogy of other cases of the same kind, that the first ten days of this or of any other month might be denoted by this combination of three rows of angles or triangles, containing three each, and meeting in a circle serving as the apex or point of con-

vergence to them all: then since we actually find such a combination as this at the very beginning of the representation, at what appears to be the actual point from which the whole must have been intended to set out; we cannot, we think, hesitate to draw the inference that these ten units, denoted in the manner which we have described, must stand for the first ten days of the proper month in which the representation is supposed to begin. And this proper month, if the representation itself had any reference to the opening of a fresh Apis cycle, and to the ceremonies and proceedings of the Apis ritual for a certain length of time after the commencement of a fresh cycle, there cannot be any doubt must have been the month Athyr; at least in the first and original type of the Apis cycle itself. We will assume therefore that these first ten units, found at this period of the representation, denote the first ten days of Athyr; and that the final end of their being placed there was to point out the date of the representation in terms of the Apis calendar: viz. that it begins and must be understood to begin on the *eleventh* of Athyr, the day after the last of these ten. We shall find this conclusion confirmed by the whole series of dates, (some of them of a very critical nature,) discoverable in the rest of the representation; which being all deduced from this, and all dependent upon this, could not be true themselves unless this was true also; and yet are determined to be true by very remarkable coincidences peculiar to themselves.

The first use which we may make of this conclusion is to explain the representation in the circular oval, of the priest and the pig, which stands immediately over this wedge, and to which the middle row of the wedge itself is perpendicular; so that, being produced through the apex of the wedge, it would pass through the centre of this circle and bisect it exactly, just in the point too where the hand of the priest has hold of the leg of the pig. If a circular disk or oval of this kind is competent to denote the moon, or the lunar month; the half of such a circle would be competent to denote half a moon or half a lunation. We have ascertained on other grounds and from other data than those of this representation [p], that the interval from the conception to the birth of

[p] Vol. ii. 504. 513. Diss. xiii. ch. ii. sect. ix.

the Apis was 280 days, or nine lunar months and one half: so that the day of his birth, and consequently the 10th of Athyr, in the first year of the cycle, necessarily coincided with the middle of the tenth lunar month from the conception. It appears to us that this is the meaning of the two figures in the circle, over the first of our wedges, and so disposed relatively to it as to be bisected by the middle row of the wedge produced. It stands for the half of the lunar month; and its object is to intimate the birth of the Apis at the end of the first ten days of Athyr indeed, but at the middle of the tenth month from the conception. The conception took place at the full of the moon; and the middle of the month, reckoned from the full, is of course the conjunction. But this makes no difference to the meaning of the symbol in this instance; if that was capable of standing for the half of the moon, or the half of the month. Now the full moon is the half of the month; and a stated sacrifice at the full moon, for that very reason, would be a competent emblem for half the month. The month is the same thing in itself, whether reckoned from the full to the full, or from the conjunction to the conjunction: and therefore half the month, whether reckoned from the full or from the conjunction, too. The sacrifice of a pig then might be properly the symbol of the full moon; but it must also be the symbol of half the month. In this instance it is the symbol of half the month, reckoned from the full of the moon; the full moon of the month of the conception of the Apis. It is the symbol therefore of the new moon; the middle of the tenth month from the full moon *before* to the full moon *after* the birth of the Apis; coincident with the tenth of Athyr*.

* Horapollo ii. 14: *Γυναῖκα ἔγγυον βουλόμενοι δηλῶσαι ἡλίου κύκλον σὺν ἀστέρι μετὰ ἡλίου δίσκου δίχα τετμημένου σημαίνουσι.*

Ἔγγυος in Greek would mean, "under bail, under legal security or bond of some kind;" and such a meaning seems altogether foreign to the symbols here described. We are of opinion that these symbols were intended to characterise a pregnant woman; a woman with child: and therefore that we should read *Γυναῖκα ἔγκυον* instead of *ἔγγυον*: for that would properly have the sense of a woman with child.

A star, accompanying the solar disk, might be fixed upon as one of the symbols to convey this meaning, from the traditionary belief of the Egyptians that the sun itself was born of a star; viz. the star Sothis or Sirius.

The meaning then of the first of the numeral combinations in the shape of the wedge, which we meet with in this delineation, is to point out the date of the representation; the day on which every thing which follows must be supposed to begin: the first day of the second decad of Athyr, the day after the birth of the Apis itself. With regard to the second such combination, in the shape of the wedge also; there are six stars between it and the first; so that, if the former was meant of the first ten days of Athyr, this latter could not be meant of an earlier date than the 17th of Athyr: and that would be an observable date in itself, being the stated day of the Isia. We are entirely of opinion however that, as the first wedge denoted the first decad of Athyr, so this second denotes the second; and therefore points to the last day of that decad, the 20th of Athyr; the last and greatest day of the Isia themselves, the day of the εὕρεσις, and consequently of the change in the character of the ceremony itself, from something more like a funeral than a feast, to an holiday or festival properly so called. No doubt this day in particular would be marked and designated in some proper manner.

It confirms this explanation of the meaning of this second wedge, and of its being intended of the 20th Athyr; that in this part of the representation, and though not directly under this wedge, yet under the first two of the *twelve* stars which come next, (when read in their proper order,) we find the figure of a goose. These 12 stars carry on the reckoning from the 18th to the 30th of Athyr; that is, to the end of the month; and the first two, all being read in the proper order, which is first upwards, and then sideways, (backwards and forwards or *βουστροφηδὸν,*) are meant of the 19th and 20th of Athyr: and under these we find the goose.

The goose (in Egyptian *Samen*) indeed is said to have been

But the other symbol, of the solar disk divided into two halves, must have been founded, we apprehend, on the idea which we have been explaining; viz. that the period of uterogestation being 280 days it was equivalent to nine lunar months and an half. On this principle, the birth must always be looked for at the middle of the tenth month after the conception. The half disk therefore would be a very natural symbol of the birth, after the legitimate interval of the uterogestation. And it is so used virtually in the case which we have been explaining.

a type of Seb, the Egyptian Kronos[q], and the reputed father of Osiris: but we do not think that the goose is introduced here in that capacity; nor do we consider this Egyptian Seb so old as Osiris, nor the fable, which made Osiris and Isis the children of the Egyptian Seb and Netpe as the same with the Grecian Kronos and Rhea, a genuine fable of the Egyptians. We are of opinion that the goose appears in this representation, and on this particular day, because it was connected with the εὕρεσις: which connection, in fact, might be the ultimate reason of its being supposed to be sacred to Seb, as the reputed father of Osiris. The goose was also the type of childhood; the hieroglyphic of a child at least[q]: and the Osiris of the εὕρεσις was the infant Osiris, the principle of vegetable life in its nascent, that is, its first and tenderest, state. We may infer too from the Roman rule of the Isia, which, as we have seen[r], was borrowed from the Egyptian, that there must have been a connection, even in the Egyptian ceremony of the Isia, between the goose and the εὕρεσις; for there was one in the Roman: and the goose was even offered in sacrifice at the conclusion of the Isia, according to the Roman rule. The month of November is thus described in the lines upon the twelve months, ascribed to Ausonius: but really older than his times[s]:

> Carbaseo post hunc artus indutus amictu
>   Memphidos antiquæ sacra deamque colit.
> A qua vix avidus sistro compescitur anser
>   Devotusque sacris incola Memphidicis.

It is plainly intimated in these lines that a goose was kept in the temple of Isis at Rome, *devoted* to the ceremony of the Isia: consequently sacrificed at Rome at the Isia, yet in the month of November; consequently on the first of November, the last day of the Roman Isia. At Rome then the goose was sacrificed at the Isia, on the last day of the Isia, the second of the days consecrated to the εὕρεσις there; and it might be so sacrificed, and on that day, because of its known injuriousness to the seed corn, or to the young blade, when first sprouting. We have no doubt therefore that the

q Wilkinson, Second series, i. xii. 165: xiii. 311: ii. xiv. 226. Birch, Egyptian Antiquities, part i. 56. Bunsen, book i. sect. vi. B. xi. xii. 406.

r Diss. xii. ch. iv. sect. iii. vol. ii. 453.

s See Bucherius, De Doctrina Temporum, 278.

goose made a concomitant of the Egyptian Isia also. But that it was sacrificed at the Egyptian Isia we have no direct testimony to allege; and we are altogether of opinion that it entered that ceremony, and made a stated part of it, not as a sacrifice, but as an emblem of the infant Osiris, the newly developed principle of vegetable life. Consequently, the proper day of its production in the Egyptian Isia would be the *εὕρεσις*, the 20th of Athyr, on which day it appears here. It is observable that the goose appears again, a little further on in the representation, at the top of the large oval enclosing the eight worshippers of the infant Apis: and it may stand there too in the same capacity of the hieroglyphic of childhood; implying that what these worshippers were adoring was the infant Apis, the Apis as yet in a state of childhood or nonage.

These two points then having been established, viz. that we have one wedge, which points out the 10th of Athyr, and another which points out the 20th; we are in a condition to set about the chronological explanation of the whole representation with some prospect of succeeding in the attempt. We must premise however that the right way of reading and interpreting the chronological notices which are found in the representation, in the shape of the stars which there occur, is to follow these stars first vertically or perpendicularly downwards, from the first of the two wedges; and then along the outer edge of the circle or border; and then, if the continuity of the series requires it, by ascending upwards along the same line of stars to the inner border, and if necessary going backwards along that too. When a number of stars are grouped together in parallel rows, they are to be read backwards and forwards; the Egyptian mode of writing, like the ancient Greek and like the Hebrew, having been from right to left, backwards and forwards, or *βουστροφηδὸν* as it is called; in which manner these characters also should be read.

The lunar or Apis date, from which this representation sets out, being known, we have no difficulty in discovering the Julian corresponding to it; nor consequently the proper year either of the æra cyclica, or of the Julian æra, to which it belongs. The former, it will be seen, is æra cyclica 3208

and 3209, the latter A. M. 3206 and 3207, B. C. 799 and 798. We shall therefore premise to our proposed review of the dates of the representation, and to such remarks as we may find it necessary to make upon them, both the solar and the lunar calendar of the year in question; the latter consisting of the last nine months of one Apis cycle, and of the first twelve months of the next—the last nine months of the cycle before that to which this representation belongs, and the first twelve months of the cycle to which it belongs and is adapted.

Primitive Solar, or Equable calendar of the Egyptians.

Æra cyc. 3208. B. C. 799.
— 3209. — 798.

Months.	Midnight.		B. C.	Months.	Midnight.		B. C.
i. Thoth	Mar.	10	799.	i. Thoth	Mar.	10	798.
ii. Phaophi	April	9	—	ii. Phaophi	April	9	—
iii. Athyr	May	9	—	iii. Athyr	May	9	—
iv. Chœac	June	8	—	iv. Chœac	June	8	—
v. Tybi	July	8	—	v. Tybi	July	8	—
vi. Mecheir	Aug.	7	—	vi. Mecheir	Aug.	7	—
vii. Phamenoth	Sept.	6	—	vii. Phamenoth	Sept.	6	—
viii. Pharmuthi	Oct.	6	—	viii. Pharmuthi	Oct	6	—
ix. Pachon	Nov.	5	—	ix. Pachon	Nov.	5	—
x. Paüni	Dec.	5	—	x. Paüni	Dec.	5	—
xi. Epiphi	Jan.	4	798	xi. Epiphi	Jan.	4*	797.
xii. Mesore	Feb.	3	—	xii. Mesore	Feb.	3	—
xiii. Epagomenæ, Mar. 5.				xiii. Epagomenæ, Mar. 4.			

Apis Calendar, Type i. Æra cyc. 3208. Cycle vii. 25 = 26.
Æra cyc. 3209. Cycle viii. 1 = 1.

Cycle vii. 25 = 26. Nine months.

Mon.	d.		Midnight.		B. C.	Mon.	d.				B. C.
i.	30	Chœac	20 June 27		799.	i.	30	Thoth	11 Mar. 20		798.
ii.	29	Tybi	20 July 27		—	ii.	29	Phaophi	11 Apr. 19		—
iii.	30	Mecheir	19 Aug. 25		—	iii.	30	Athyr	10 May 18		—
iv.	29	Phamen.	19 Sept. 24		—	iv.	29	Chœac	10 June 17		—
v.	30	Pharmu.	18 Oct. 23		—	v.	30	Tybi	9 July 16		—
vi.	29	Pachon	18 Nov. 22		—	vi.	29	Mecheir	9 Aug. 15		—
vii.	30	Paüni	17 Dec. 21		—	vii.	30	Phamen.	8 Sept. 13		—
viii.	29	Epiphi	17 Jan. 20		798.	viii.	29	Pharmu.	8 Oct. 13		—
ix.	30	Mesore	16 Feb. 18		—	ix.	30	Pachon	7 Nov. 11		—
						x.	29	Paüni	7 Dec. 11		—
						xi.	30	Epiphi	6 Jan. 9*		797.
						xii.	29	Mesore	6 Feb. 8		—

i. Epagomenæ 5, Mar. 8.

SECTION VII.—*Chronological Synopsis of the Representation on the outer border of the circular Zodiac of Denderah, reduced to the Apis cycle, Cycle viii, year i, of Type i.*

Month.	Fig.		Stars.	Sum.		Æra cyc. 3209.	B.C.798.
i	1	Underneath the figure in the circle	1	1	Luna 2	Athyr 11	May 19
	2	Under the sistrum	5	6	7	16	24
	3	Under the left hand	1	7	8	17	25
	4	Middle of the back of the cow	1	8	9	18	26
	5	Over the goose	12	20	21	30	June 7
	6	Circle, enclosing the 8 priests					
	7	Under the left hand (Ibis-headed fig.)	2	22	23	Chœac.... 2	June 9
	8	Over the head of the calf (Apis)	1	23	24	3	10
	9	Under the left hand	2	25	26	5	12
	10	Under the left hand	2	27	28	7	14
ii	11	Under the left hand	3	30	Luna 1	10	17
	12	Between the two next figures, underneath	4	34	5	14	21
	13	Under the left hand and by the head..................	3	37	8	17	24
	14	Between the cynocephalus and the bust	3	40	11	20	27
		End of the 40 days of Diodorus. Nine stars omitted in the above.					
	15	Under the left hand	2	42	Luna 13	Chœac.... 22	June 29
	16.16	Under the two left hands, and under the two legs above ..	3	45	16	25	July 2
	17	Under the left hand	1	46	17	26	3
	18	Under the left hand	6	52	23	Tybi...... 2	9
	19.19	Under the two left hands	6	58	29	8	15
iii	20	Under the left hand	3	61	Luna 3	11	18
	21	Under the left hand and by the head..................	4	65	7	15	22
	22	Under the left hand and by the head..................	10	75	17	25	Aug. 1
	23	Under the left hand and by the head..................	3	78	20	28	4
	24	Under the water vessel and the left hand of next figure	4	82	24	Mecheir .. 2	8
	25	By the head of the Uræus on the left and underneath	2	84	26	4	10
	26	Under the left hand	3	87	29	7	13
iv	27	Under the left hand and over the pig..................	16	103	Luna 15	23	29
	28	Over the head, and underneath	8	111	23	Phamenoth 1	Sep. 6
	29	Left of the bust and underneath	2	113	25	3	8
	30	Over the 4 figures	4	117	29	7	12
v	31	Left of the figure seated on the lotus.	2	119	Luna 2	9	14
	32	By the head, and under the left hand	2	121	4	11	16
	33	By the head, and on the left ..	3	124	7	14	19
	34	Left of the bust with four heads	1	125	8	15	20
		Natales Apidis begin.					
		Thirteen stars omitted in the above.					
		Noted in all...............	....	125			
		Omitted 9 + 13	....	22			
		Sum total	....	147			

SECTION VIII.—*Remarks on the preceding Synopsis, and confirmation of its details.*

No. 1.

The Representation begins on the day after the birth of the Apis, Athyr 11 æra cyclica 3209, May 19 B. C. 798; on each as reckoned from midnight according to the Julian rule; (which rule of the reckoning of the noctidiurnal cycle in these remarks we propose to follow throughout:) on the luna secunda of the lunar month of Athyr according to the Apis reckoning. And it begins on this day, which was the day after the birth of the Apis, because it was the first day on which its birth could be supposed to become known, and consequently its first public recognition to take place. It would be manifestly improper to suppose that to have taken place on the day of the birth, and not first on the day after the birth.

It is very observable that the first star (No. 1.) stands over or by the head of a figure holding a sistrum, which is evidently that of a priest; as well as next to the first of the wedges, which points out the beginning of the representation on Athyr 11. The sistrum was used by the Egyptians for the same purposes as the trumpet; though it was not a wind instrument, but a species of drum, or timbrel.

Regina in mediis patrio vocat agmina sistro[s].

This figure is here introduced to notify the birth of the Apis; and he must be supposed to be using the sistrum for that purpose.

No. 2.

Five stars; one of which is imperfect, but the edge of it is still to be seen.

No. 3.

The first day of the Isia, Athyr 17 May 25. It falls on the first lunar dichotomy; the luna 8va of the moon of Athyr; a coincidence which could characterise only the first year of the cycle. The figure to which the star, which de-

[s] Virgil, Æneid, viii. 696: cf. Propertius, iii. xi. 41–44. Pro classico sistrum posuit, observes Servius in loc.: cf. Isidore, Origines, iii. 21. p. 27. C. Plutarch, De Iside et Osiride, lxiii., and the passages quoted or referred to Diss. xii. ch. iv. sect. i. note, vol. ii. 446: Diss. xiii. ch. i. sect. ii. vol. ii. 472.

notes this day, is attached is probably that of Anubis, the jackal-headed god: and in the ceremony of the Isia, Anubis acted a conspicuous part[t]—which may account for his introduction here.

No. 4.

The cow of Mycerinus appears on this day first, Athyr 18 May 26, the luna 9[a]. Consequently on the second day of the Isia; which is thus ascertained to have been the stated date of its production. According to Herodotus, it must have been produced while the lamentations for the supposed death of Osiris were still going on: consequently on one of the three days devoted to that part of the ceremony, Athyr 17, 18, and 19: and as it seems on the middle one of the three themselves; which is a very observable circumstance. It is evident that this animal must have been intended for a cow; particularly from the head and the horns, which are those not of a bull but of a cow. The temple at Denderah is said to have been sacred to Athor[u]: her cow had its peculiar marks[w]; and one of the most remarkable of these was its long horns, and the solar disk[u]—resembling those of this cow exactly. This was also the insigne of the cow which, according to Herodotus, represented the daughter of Mycerinus[x]: *Μεταξὺ δὲ τῶν κερέων ὁ τοῦ ἡλίου κύκλος μεμιμημένος ἔπεστι χρυσέος*: and in which cow he supposes her to have been buried[y]. It is agreed however that this cow of Athor, after all, and consequently Athor herself, was only an emblem of Isis[z], and another name for Isis. Aphroditopolis, which Herodotus calls *'Ατάρβηχις*[a], and in which there was a temple of Venus (Athor) in his time, was very near to Denderah; and according to Strabo[b] a white cow was kept there, sacred to Athor the Egyptian Venus; that is, to Isis. This cow of the exterior border is white too; and that is another mark of its sex, and of its identity with the cow of Athor.

[t] Cf. Plutarch, De Iside, xiv.: xxxviii.: xliv.: lxi.: Diodorus Siculus, i. 18. See Supra, testimonies to the Isia, vol. iii. 81.

[u] Wilkinson, Second series, i. xiii. 390, 391. Bunsen, B. i. sect. vi. B. 400–402. Birch, Egyptian Antiquities, part i. 19, 20.

[w] Wilkinson, Second series, ii. xiv. 194.

[x] ii. 132. [y] 129–132.

[z] Wilkinson, Second series, i. xiii. 359: cf. 371. 382, 383.

[a] ii. 41: cf. Steph. Byz. 'Αφροδίτης πόλις.

[b] xvii. 1.

N. B. There are two stars over this, one on the left, the other on the right, of the second wedge; which, in our opinion, were not intended to enter into the continuous reckoning of stars as the same with days: and therefore have been omitted by us.

No. 5.

These 12 stars carry on the account to the 30th of Athyr, the end of the first solar month which enters the representation, June 7: and this too is something observable; for this being the month of the birth of the Apis it would be considered sacred on that account; and its termination might be specially pointed out. These stars are to be read first backwards and then forwards; beginning with those which stand at the bottom, or over the head of the goose—Athyr 19, 20, and 21. The symbol of the goose, as we have explained, is attached more particularly to the second of the two, more immediately over its head, the 20th Athyr; the date of the εὕρεσις, and of the consequent first manifestation of the infant Osiris.

No. 6.

Over or about the next figure, which is the circle, enclosing the priests adoring the Apis, there is only one star; viz. that which precedes the figure of the goose at the top: and this we consider to be excepted. The absence of stars in connection with this circle and with the objects included in it is remarkable. We must infer from this fact that what is represented in this manner, the adoration of the young Apis by the priests, belongs to no particular day. The place assigned to this group too in the order of the representation is remarkable also. It is the middle point of the interval of 40 days, between the birth of the Apis on Athyr 10 and the end of the period of comparative seclusion in which it was kept at first, Chœac 20: during which time indeed it must be visible to the priests and to its proper attendants, but probably to none else, except the women of Egypt.

But with respect to the meaning of this representation itself; we have already observed that the figures exhibited in this circle are evidently those of priests, and evidently engaged in an act of worship, the object of which is the infant Apis, who appears in the form of a calf not far from them in

front; and besides is typified by the goose on the top of the circle itself. But as to the number of these figures, so represented, and in this posture, it is neither more nor less than eight; and all eight are enclosed in the same circle. We were told by Pliny, Solinus, and Ammianus Marcellinus[c], that the Apis was wont to be conducted to Memphis by an hundred priests: or that he never appeared in public without a retinue or attendance of priests. We do not know however that the circle possessed the power of denoting one hundred: or that these eight priests enclosed in it, on any principle of construction, can be considered the representatives of that particular number of the body to which they belonged: though they might be considered, either collectively or individually, the representatives of the sacerdotal order in general. Besides, at this time, only 20 days after the birth of the Apis, and while he was still in comparative seclusion, there could be no room for any such representation as that of a public procession of the Apis, attended by any number of his priests whatsoever.

In our opinion, the meaning of this representation in particular is something very different from this, and at first sight not easy to be divined; and in fact, without a previous knowledge of the Apis cycle and of the reference of the whole of this representation to that, incapable of being divined at all—but, when once pointed out, such as to recommend itself by its own consistency and its own probability. The circle which is here exhibited is one of unusually large dimensions. It is greater than any thing of the kind which occurs in any part of the representation besides; and no doubt some peculiar distinction must have been considered to belong to it. Now this is explained at once, if this circle is supposed to be the type of the Apis cycle itself. It requires no argument to prove that a circle could be so appropriate a symbol of nothing as a cycle; and therefore, if necessary, of the Apis cycle: in which case, if it entered a representation like this, and in that capacity, it must be exhibited as something different from an ordinary circle. The number of figures enclosed in this circle is eight. They are all represented alike, and there is not the least difference discoverable

[c] Vol. ii. 475, Diss. xiii. ch. i. sect. ii. Testimonies to the Apis.

between one and another of them. The attitude of all is the same, and in each it is that of worshippers; and the object of the worship of all alike is evidently the young Apis. It is manifest therefore that any one of these eight would be competent to represent the same order or class of persons in general; those who stood to the Apis in the particular relation of his worshippers: and these it is evident must be first and properly his priests. Every Apis, and in every cycle, had his proper class of worshippers, all belonging to this order in general; the priests of his proper cycle*.

Now it is a very remarkable coincidence that, if the date of this representation is actually that which we have assigned it, it begins in the first year of the viiith Apis cycle. There had been seven cycles before that to which this representation belongs, but no more: and this, in which it opens itself, was the eighth. We are entirely of opinion that this coincidence, and this alone, is the true explanation of the great circle, and of the eight figures enclosed in it, which meets us at this particular period of the representation. The circle itself is the type of the Apis cycle, which in its own nature might be considered invariable and always the same; but it was liable to change its living representative in the person of the Apis, and its proper order and succession of ministers, in relation to one cycle after another. It is implied by the eight figures within this circle, that this type of the cycle had been eight times changed; and this service had been eight times required in relation to eight different cycles: and this would be strictly true, at the ingress of the viiith cycle from the epoch, æra cyc. 3209; with this difference only that the type of the viiith cycle was still living, in the person of the young Apis just entering on his proper cycle; and the service of his ministering priests and attendants, in reference

* It is far from improbable that, as there was a fresh Apis for every cycle, so there was a fresh order of serving or ministering priests for every fresh cycle too. Such was the rule with the Levites among the Jews. They began to serve at 25 and ceased to serve at 50: (Numb. viii. 24, 25;) that is, their term of office properly so called lasted 25 years, or one Apis cycle. The same rule might exist among the priests in Egypt, those at least whose duty it was to attend on the Apis, and to perform every menial office in his behalf. If this rule actually existed there, it would explain the representation in this oval at once.

to this viiith cycle, was only just beginning too. But it was a service the same in all respects which had been rendered by the same description of attendants and ministers, in relation to past cycles: and therefore the proper representatives of the service of this cycle, though only just beginning, were not to be distinguished from those who had stood in the same relation to the cycles already past.

No. 7—14.

With regard to the procession, which comes next in the order of the representation; it is very observable that the number of figures, preceding the young Apis, i. e. of those who may be properly said to be conducting it somewhere or other, is limited to five. These five compose the conductors or προπομποὶ of the Apis properly so called; distinct from the Cynocephalus, seated in the boat in the front, and from Thoth, with the beak of the Ibis, next to the Apis itself behind. We have learnt from Clemens Alexandrinus[e] that on all solemn occasions the number of parties, composing the public processions of the Egyptians, were at least five; the names and style of each of whom he specified distinctly, as the ᾠδὸς, the ὡροσκόπος, the ἱερογραμματεὺς, the στολιστὴς, and the προφήτης, besides certain others, whom he appears to have classed together under the general name of παστοφόροι; i. e. of those whose duty it was to carry the sacred bread. These five figures conducting the Apis in all probability, and *mutatis mutandis* merely, were intended to answer to these five principal members of all such solemn processions; only that they are not to be supposed to be composed of priests, whatsoever their rank or sanctity, or particular office and duty; but of certain of the inferior divinities of the Egyptians themselves, who are discharging the same kind of duty and service on this occasion in honour of Osiris, (the greatest of the gods of the Egyptians, and their own principal or superior too,) in the person of the Apis. Thoth Lunus follows behind, in his proper capacity of the scribe, it is true; but of the gods and not of men; and distinct from the five composing the procession also.

The number of stars which carry on the continuous reckoning from No. 7 inclusive to 14 inclusive, we apprehend

e Supra, note, p. 188.

to be 20, extending from Athyr 30 to Chœac 20, June 7 to June 27, and from the luna 21 of the first month to the luna 11 of the second month. It is manifest that the mystical procession is supposed to be going on all this time; but only in the mystical sense. It takes up the last half of the period devoted to the privacy of the Apis: and as it must end in his public recognition at last, which was the first step towards his solemn installation at Memphis, this seems to be the true reason why the procession is represented as headed by the Cynocephalus, seated in the boat in front; as if he were going to conduct it at once down to Memphis. The first 40 days were a very important division of the whole of the period between the birth and the installation of the Apis. At the end of these the Apis was made public in some manner or other, in which he had not been so until then: and that was so naturally the prelude to his still more public and solemn recognition at the high festival of the natales, that we cannot be surprised if the end of these forty days is represented apparently by some of our testimonies, (for instance, that of Diodorus [f],) as the beginning of the ceremony of his installation itself.

We give two stars only to No. 7, 9, 10, respectively: and one to No. 8. There are three more in No. 8, but they appear to us to be excepted. The stars in No. 11 are imperfect; but the outlines of three may be distinguished. Three stars, No. 10–12, in the upper margin, are also omitted. No. 13, there is a large star, much more conspicuous than any which has yet appeared. These three stars being read upwards, the Julian date of this last is June 24, that is, the summer solstice in the sphere of Mazzaroth: which accounts for the distinction and prominence assigned to it. No. 14 brings us to the 40th day from the birth, Chœac 20, June 27, the lunar 11th of the second month. The 40 days of Diodorus consequently end here: and here too we find the first bust of the Apis; one of the marks of the integral divisions of the representation, supplied by itself.

No. 15.

One star, by the head of this figure, (on the left,) is omitted.

[f] Vol. ii. 474, Diss. xiii. ch. i. sect. ii.

No. 16. 16.

A small star, between the two next figures, is omitted also. Three stars are here taken into account; the third of which (read upwards) stands under the two legs, represented as walking: and in size and prominence this star is altogether like to that which we noticed in No. 13, attached to June 24, the date of the summer solstice in the sphere of Mazzaroth. The Julian date of this star is July 2, corresponding to Chœac 25. Now it is capable of proof that July 2 was the actual date of the summer solstice, B. C. 798*, and that being the case, it is a striking confirmation of all the preceding details.

We find this star attached in the representation itself to the hieroglyphical symbol of two legs, which appear to be in the act of walking: and two legs in the act of walking, as every one must allow, would be the most natural symbol imaginable for the act of locomotion, or, as the Greeks would have expressed it, of the *φορὰ πόθεν ποῖ*. But locomotion may be either forwards or backwards; and these acts of locomotion would be so contrary to each other, that the same representation could not possibly serve for each.

The ancient Egyptians were too close and exact observers of nature not to have taken notice that in all the acts and functions of the members of the human body which are double of their kind, a right and a left; those of the right take precedence of those of the left: the right arm of the left arm, the right leg of the left leg. This being the case; to express motion forwards or in the natural direction, they put the right leg before the left: to express motion backwards, they reversed this arrangement, and put the right leg behind the left; or what came to the same thing the left leg before the right[g].

			h.	m.	s.
*Mean vernal equinox at Jerusalem, B. C. 798,	March 31,		15	41	2·4
			—	15	44
At Heliopolis, ...	March 31,		15	25	18.4
One quarter	+ 91,		7	27	12·6
Equation of the centre	June 30,		22	52	31·0
	+ 1,		1	3	17.8
True summer solstice	July 1,		23	55	48·8

[g] Cf. the chevalier Bunsen, B. 1. App. ii. B. 542. Determinatives, 62 and 63. Horapollo, ii. 3: Δύο πόδες συνηγμένοι καὶ βεβηκότες δρόμον ἡλίου τὸν

Now the symbol which actually occurs in the representation, in this instance, is that of the left leg before the right; from which we must infer that motion backwards, not forwards, was the idea intended by it. And this consideration, combined with the other two coincidences which have just been pointed out, that the Julian date of this symbol is July 2, and July 2 was the actual date of the summer solstice B. C. 798, can leave no doubt that the physical phenomenon of the turning back of the sun was intended to be noted and pointed out in the representation, just at this moment. These two legs are as significant for that purpose here, as the algebraical symbol of the solstice itself, ♋, (the principle of which, as we have explained[h], was just the same,) would have been.

No. 17.

Next to this figure, and almost in a line with its left shoulder, is a bird resembling the Ibis, and under it a small star, which we omit.

No. 18.

A star, in a line with the head of this figure is omitted.

No. 19.

A star similarly situated by the head of each of the two next figures is also omitted. And this brings us to the end of the first 59 days, or first *δίμηνον*, Tybi 8 July 15 both inclusive.

No. 20.

A star, near the head of the next figure, is omitted here too: but three are taken into account at the bottom, which bring us to July 18, Tybi 11.

No. 21.

Four stars are taken into account here; three under the

ἐν ταῖς χειμεριναῖς τροπαῖς σημαίνουσι. This must have been a different kind of symbol from that which we are considering; these two legs being in a line, or side by side, yet supposed to be in motion too. Now this was the kind of motion attributed to the gods; motion forwards, without seeming to stir the legs: and the motion of the gods too must be supposed the most rapid of all. We should be of opinion therefore, that this peculiar symbol was selected, in order to represent the rapidity of the sun's motion at the winter solstice: at which period of its course it has always been either at, or just past, the Perigee, and therefore moving with the greatest velocity. Cf. Porphyry, apud Eusebium, Præp. Evang. iii. 11. § 47. 248, 249.

h Vol. iii. 375, Diss. xv. ch. vi. sect. vi.

left hand of the next figure; the fourth close by the head. And this star is of greater size and prominence than any which has yet come under our notice; so that we may reasonably presume even from its form and appearance that it must have been understood to be something remarkable of its kind. These four stars being read in the order pointed out, viz. upwards, this is the fourth; and its Julian date is found to be July 22: i. e. the first and original date of the Sothiacal period, and its proper date in the first year of its proper cycle of leap-year ever after. B. C. 798 was a year of this description: and July 22 would be the stated date of the heliacal rising of Sirius this year. This, we think, is abundantly sufficient to account for the distinction assigned to this star, in comparison of any other which has yet passed in review before us. It was the star of Sothis or Sirius: and its calendar date, B. C. 798, was the proper date of the most memorable phenomenon, in the apprehension of the Egyptians, which the heavens had annually to shew.

It contributes not a little to confirm this date, that if we ascend, at this moment, out of the limits of the exterior circle, into the interior compartment which contains the zodiac and the rest of the figures on the cieling; the first object, which we perceive, yet most contiguous to, or at least in a line with this star, is the figure of an animal, resembling a cow, lying or reclining in a boat; and between its horns a large star also. There can be little question, from the shape of the horns, that this animal is meant for a cow; and from its posture, recumbent in a boat, it is manifestly intended as divine. Now we have already had occasion to shew[1] that the cow was connected by the Egyptians with Sirius or Sothis, as the emblem of Athor or Neith, (both of them merely other conceptions of Isis,) and with Isis herself; in the specific character of the cow of Sothis, the cow which gave birth to the sun. This cow then in the interior circle, but connected by its position with this star in the exterior circle, is the great cow in question. It is Athor or Neith, or Isis, the mother of the sun; and the star between

1 Vol. iii. 34, Diss. xiv. ch. i. sect. xi. Cf. Egyptian Antiquities, Part i. page 12–20. Wilkinson, Second Series, 11. xiii. 366—394. cf. 67 and 78. Bunsen, B. i. sect. vi. A. 386: sect. vi. B. 400–402.

the horns of this cow means the same thing as the star below, attached to July 22.

No. 22, 23.

No stars are omitted in either of these numbers.

No. 24.

One star, in a line with the head of the next figure, is left out here; because it appears to stand apart from the proper line of the reckoning. Four stars however are taken into account; two under the left hand of the figure, and two over its head, read backwards. The Julian dates of the first two are August 5 and 6, and those of the second two are August 7 and 8.

Now if the representation in general is truly to be referred to B. C. 798; this particular date, August 8, could not fail to be something remarkable in that year. It was the Julian date of the Babylonian calendar and Babylonian cosmogony, in the first year of the cycle of leap-year; such as B. C. 798 also was. It was the supposed date of the first production of things by the Babylonian Belus out of the element of water. It was the date of the cosmogony adopted by the Egyptians also, and in this very year itself, as we have seen [k]; and of the *genitura mundi*, when the sun and the moon and the five planets were supposed to be all posited in the xvth degrees of their proper signs or houses; as the sun and the moon in particular actually were, the former in the xvth of Leo, the latter in the xvth of Cancer, on this very day, August 8, B. C. 798 [k].

Now here too, if we travel out of the limits prescribed to the proper chronological details of the representation, (those of the exterior circle,) the first object which meets us, and right over the two stars, corresponding to August 7 and 8, is the figure of a large bird, crowned with the *Pschent*, (the double crown, the emblem or insigne of Dominion, and properly of Upper and Lower Egypt—dominion at least on the widest scale,) and standing on something which can be intended of nothing but a receptacle of water, a water-vessel, or phial, but of unusually large dimensions. Similarly shaped vessels may be perceived in other parts of the representation; as in

[k] Vol. iii. 439, Diss. xv. ch. vii. sect. v, sqq. Ch. ix. sect. x. p. 542.

the hands of the figure over No. 19 and under the Lion standing on the back of the Hydra; and in those of the figure which stands over the large oval, inclosing the eight figures, explained supra[l]. And from these vessels water is actually flowing in a copious stream; so as to leave no doubt of their nature. We take it for granted then, that the vessel on which this bird is standing is a vessel of water too; though of much larger dimensions: and of water not yet poured out; of a water-vessel still full. The bird itself is the sacred hawk, the symbol of Ra or Phre, the sun. We should explain the occurrence of such figures and such symbols as these here, in connection with these particular dates of August 7 and 8, if we might suppose that these dates themselves were already traditionally connected in Egypt with the production of the universe from water by the sun, on this day too; as they could not fail to be, if the Babylonian doctrine relating to that point had already been adopted in Egypt, and in this very year.

No. 25.

The next figure is that of the Uræus, or Serpent Basilisk (*Βασιλίσκος* or Regulus), of which Horapollo, at the very beginning of his work, gives the following account[m]: *Αἰῶνα σημαίνοντες ἥλιον καὶ σελήνην γράφουσι, διὰ τὸ αἰώνια εἶναι στοιχεῖα. αἰῶνα δ' ἑτέρως γράψαι βουλόμενοι ὄφιν ζωγραφοῦσιν ἔχοντα τὴν οὐρὰν ὑπὸ τὸ λοιπὸν σῶμα κρυπτομένην, ὃν καλοῦσιν Αἰγύπτιοι οὐραῖον, ὅ ἐστιν Ἑλληνιστὶ βασιλίσκον· ὅνπερ χρυσοῦν ποιοῦντες θεοῖς περιτιθέασιν· αἰῶνα δὲ λέγουσιν Αἰγύπτιοι διὰ τοῦδε τοῦ ζώου δηλοῦσθαι, ἐπειδὴ τριῶν γενῶν ὄφεων καθεστώτων τὰ μὲν λοιπὰ θνητὰ ὑπάρχει, τοῦτο δὲ μόνον ἀθάνατον· ὃ καὶ προσφυσῆσαν ἑτέρῳ παντὶ ζώῳ δίχα καὶ τοῦ δακεῖν ἀναιρεῖ. ὅθεν ἐπειδὴ δοκεῖ ζωῆς καὶ θανάτου κυριεύειν διὰ τοῦτο αὐτὸν ἐπὶ τῆς κεφαλῆς τῶν θεῶν ἐπιτιθέασιν.*

In what is thus stated respecting this serpent, as an insigne of the gods, Horapollo is confirmed by the monuments of Egypt at present[n]. In his explanation of the Greek name of this serpent, *Βασιλίσκος* or Regulus, as meaning the same thing with the Egyptian *οὐραῖος*, it is agreed that he is correct also; the root of the Egyptian name of this serpent

[l] p. 305. [m] i. 1. [n] Bunsen, i. 368.

being either the Coptic Ouro, which denotes king[o], or the more ancient **Ara*, which appears in the chevalier Bunsen's vocabulary[p].

Now if this was the case, and the serpent Basilisk was not only the type of divinity, but also the type of eternity, and in particular of a power and influence, which was just as effective for life as for death, for production as for destruction; we cannot imagine a symbol more likely *a priori* to have been fixed upon as the proper symbol of alternate life and death, alternate generation and regeneration, like that of successive incarnations and metempsychoses of Osiris in the person of one Apis after another. The ancients, beginning with Herodotus, as we have seen[q], agree in reporting that the particular mode by which the Apis, the future type of every fresh cycle, was generated or conceived in the body of the cow destined to give it birth, was by an unseen and mysterious influence of this kind; which they compare to a flash of lightning: and in this manner too, according to the Greek version of the fable, Epaphus the Greek representation of the Apis, as the offspring of Io in the form of a cow, is supposed to have been generated; viz. ἐξ ἐπαφῆς Διὸς, and nothing more; and from that mode of his generation itself to have derived his name. This Grecian version of the fable of the Apis is older than Herodotus; but we do not know that it is older than Æschylus, the first of the Greeks in whom it appears: nor consequently older than the Apis cycle itself among the Egyptians, or even as old as it.

Such then being the actual manner, according to the fable from the first, in which the Apis was supposed to be generated; by a secret influence of some kind, endued with the power of life and death, of production as well as destruction, yet both in the same way: what was more probable than that, as the proper hieroglyphic or symbol of this influence, the Egyptians would pitch on their Uræus, or serpent Basilisk, to which they ascribed this power in both its acts and energies, and in so eminent a degree? the power of destroying the living representative of a given cycle, and the power of

o Wilkinson, First Series, ii. v. 184: Second Series, i. xiii. 240.

p B. i. App. i. 457, No. 72.

q Vol. ii. 474, Diss. xiii. ch. i. sect. ii; Testimonies to the Apis.

reproducing it in the next? the power of terminating the cycle at stated times, and yet of continuing it too, as if it never could come to an end? If so, and the Uræus was really the type of this power, the secret, ever-present, and ever-active influence, by means of which the succession of the Apis cycle was both terminated and kept up; in such a representation as this which we are considering, where was this emblem so likely to be found, as at the date of the conception of the Apis?

It cannot be necessary to prove that, if there was a stated date for the birth of the Apis, there must have been a stated date for its conception; and a stated interval of time, as the proper measure of the period of uterogestation between the two. We have already seen reason to conclude that this interval was purposely assumed at 280 days [r]: and consequently that the stated date of the birth at last being the new moon of Athyr, in the first year of the cycle, the stated date of the conception previously must have been the full moon of Tybi in the last year of the preceding cycle. Let us proceed then to consider how far these conclusions are confirmed, or not confirmed, by the symbols which are discoverable at this particular stage of the representation.

The Uræus, of which we have been speaking, stands on a kind of altar or pedestal, by itself. There is one star underneath on the left, level with the top of this pedestal; and there must once have been another in a line with the first, above, near the head of the Uræus, as the outline of it may still be perceived. And, to judge even from what appears of its shape at present, this must have been of extraordinary size, larger even than the star which represented Sirius; and differing from that, in not having its radii regular and all of a size, but one of them more pointed and more elongated than the rest. We are entirely of opinion that these peculiarities were intended to characterise the supposed date of the conception of the Apis; the star, in its proper chronological order, in the course of the representation hitherto, denoting the day of the event; the pointed and elongated apex of one of its radii, the influence emanating from some unseen power, and producing its effect on this day in the gene-

[r] Vol. ii. 504. 513. Diss. xii. ch. ii. sect. ix.

ration of the Apis; and the Uræus, or serpent basilisk, the active agent in the production of the effect itself.

The Julian dates of these two stars are August 9 and 10; the Egyptian Mecheir 3 and 4: the lunar, the luna 25ª and 26ª: but the proper date with which we are concerned, as that of the conception, is the second, Mecheir 4, August 10, the luna 26ª. We must observe however that the year, which we are considering, is the year of the birth, the first year of the cycle; not the year of the conception, the last year of the preceding cycle. Now Mecheir 4 and August 10 might both be the same, both in the last year of the preceding cycle and in the first year of the next; or at the utmost could differ only by a day: but the lunar date, agreeing to either in the first year of the cycle, could not possibly be the same with that which corresponded to it in the preceding year: it must be ten or eleven days higher than the latter at least. Consequently, if Mecheir 4 and August 10 were both the Luna 26, B. C. 798, æra cyc. 3209; B. C. 799 æra cyc. 3208 they must both have been the Luna 15ª or 16ª. If therefore the date of the conception of the Apis, B. C. 799 æra cyc. 3208, was Mecheir 4 or August 10, it was also the lunar 15th or 16th.

Now this is verified at once by the scheme of the Apis calendar, for the last lunar year of cycle vii, type i, which we premised supra [r]. This year is an imperfect one in every type of the cycle, consisting of nine months only, instead of twelve; and in the first type of the cycle, the stated date of its first month was Chœac 20; which æra cyc. 3208, B. C. 799, corresponded to June 27. Consequently the date of the second month was Tybi 20, July 27; and therefore the πανσέληνον or lunar xvth of that month was Mecheir 4, August 10.

This date then being assumed as the date of the conception of the Apis, in the last year of cycle vii. æra cyc. 3208 B. C. 799; let us reckon on from it 280 days, the supposed interval of the uterogestation; and it should bring us to the date of the birth, Athyr 10, cycle viii—æra cyc. 3209 B. C. 798. Mecheir 4 is the 154th day from the beginning of the equable year.

[r] Page 301.

Hence, Mecheir 4	=	154
		280
		434
Cast off		365
		69

And the 69th day from the beginning of the equable year in like manner is Athyr 9. It is evident then, on this principle, that if we take in the day of the conception, Mecheir 4, and reckon 280 days inclusive of that; we come to the day before the birth, Athyr 9 exclusive: and if we leave out the day of the conception, and reckon 280 days from the first day after the conception, Mecheir 5 inclusive, we come to the day of the birth Athyr 10 exclusive. And it appears to us that this is the principle on which we ought to reckon; that of 280 days' interval from Mecheir 4 exclusive, to Athyr 10 exclusive also; leaving out both the day of the first communication of the influence, followed by the conception and the consequent beginning of the proper interval of the uterogestation, and the day of the birth also, the proper date of the termination of that interval itself.

It seems then that, agreeably to the conjecture with which we set out, we find in this symbol of the Uræus, and in the date assigned to it in the order of the representation, the solar date of the conception of the Apis, in the first year of the cycle; by means of which we are enabled to recover the lunar date of the same event, in the preceding year of the cycle; and this recovery shews that lunar date to have been the *πανσέληνον* or full moon of the proper month. It is evident consequently that between the conception at this period of the old cycle, and the birth at the proper period of the next, in the lunar reckoning there must be nine months complete and half of one more; and we have already seen that the first symbol which we met with, and at the very commencement of the representation, and over the very day of the birth itself, was one which when rightly interpreted pointed directly to that fact; the birth of the Apis at last, just at the middle of the tenth month from the conception.

No. 26.

One star is omitted; close to the head of the figure, next to this.

No. 27.

We reckon 16 stars here; one under the left hand of the figure, fifteen over the pig: and we omit *one*; that which stands over the first row of these fifteen at the top.

Now this figure, the left hand of which here too is directed towards the tail of the pig, is much the same in appearance as that which was exhibited, at the commencement of the representation, inside of the circle, holding a pig by the foot with its left hand: and in that instance the pig was the type of the middle of the month; a meaning ultimately derivable from the fact of its being properly the type of the middle of the moon; that is of the full moon.

That the pig among the Egyptians would probably be selected as the standing type of the full moon seems to be only a natural consequence of the fact mentioned by Herodotus; that though the swine was ordinarily esteemed by them an unclean animal, (perhaps for the reason assigned by Proclus[s]; perhaps because it was an unclean animal among the Jews,) yet it was offered in sacrifice, and its flesh was eaten once in the year, but once only; and that once at the full of the moon: Σελήνῃ δὲ καὶ Διονύσῳ (Isis in fact and Osiris) *μούνοισι τοῦ αὐτοῦ χρόνου τῇ αὐτῇ πανσελήνῳ τοὺς ὗς θύσαντες πατέονται τῶν κρεῶν ... τὰ δὲ ἄλλα κρέα σιτέονται ἐν τῇ πανσελήνῳ ἐν τῇ ἂν τὰ ἱρὰ θύσωσι· ἐν ἄλλῃ δὲ ἡμέρῃ οὐκ ἂν ἔτι γευσαίατο*[t]. We have no doubt this exception was first made in its favour at the time of the rise of the fable of the Apis; and when the stated date of the conception of the Apis was first attached to the full of the moon of a certain month. For the full moon is the most appropriate natural type of impregnation and fecundity; and no animal might appear to sympathise more with the full moon in that respect, by its natural fecundity and by the circum-

[s] Ad Hesiod. Opp. et dies, 767: Τὴν δὲ σῦν ἀνίερον Αἰγύπτιοί φασιν, ὅτι μίξεσι χαίρει κρυπτομένης ὑπὸ τοῦ ἡλίου τῆς σελήνης. Cf. Plutarch, De Iside et Osiride, viii.

[t] ii. 47. Cf. Ælian, De Natura Anim. x. 16. Sextus Empericus, iii. 24. § 220. p. 183: Οἷον γοῦν Σαράπιδι χοῖρον οὐκ ἂν θύσειέ τις, κ᾽, τ. λ.

stance of its repeatedly bringing forth as many young pigs as there are days in the half-month, than the swine.

Now the Julian dates of the first two stars on the left of this figure read upwards are August 14 and 15, the Egyptian Mecheir 8 and 9; the latter the date of the luna prima of Mecheir in the first year of the cycle, type i: as appears from our calendar, B. C. 798 æra cyc. 3209. If so, the 14 stars which come next and stand over the back of the pig, must be the 14 days from the luna prima of Mecheir to the *πανσέληνον* or calendar full moon, the lunar 15th. In this case, it is the stated date of the sacrifice of this same pig, which could not be offered on any day of the month but the *πανσέληνον* or calendar full moon; and is now going to be offered at the *πανσέληνον* or calendar full moon of Mecheir, in the first year of the cycle, type i. This explanation of the symbol must carry its own proof along with it. We look upon it to be as striking a confirmation of the truth of the interpretation which we have hitherto put on the whole of this representation, as any thing which has yet appeared.

No. 28.

We reckon on 8 stars next in order; seven in front of the figure represented as kneeling, and one above it. This figure has four figures on its head, which appear to be meant of asps, and it has itself the appearance of an human figure with the head of a Cynocephalus. The asps would be tokens of divinity [u], or of dominion [w]. A bust of the Apis is next to it; the second which has yet appeared. Possibly the occurrence of the bust here may be explained by the date of the last of the stars, which is Phamenoth 1, September 6, the first of the solar Phamenoth; which was probably an high month, because in the lunar Phamenoth corresponding to it the natales apidis themselves were celebrated. We do not however profess to understand these emblems here; and we are unwilling to hazard mere conjectures concerning them.

No. 29.

Next to the bust, we take in two stars, in the same vertical

[u] Ælian, De Natura Anim. x. 31. [w] Wilkinson, Second series, i. xiii. 239.

line, one below, the other above, Phamenoth 2 and 3, September 7 and 8, luna 24 and 25.

No. 30.

There is next, on what appears to have been a pedestal, like that of the Uræus, (No. 25,) a group of four figures, which have the heads of Cynocephali, and are standing seemingly on the tails of serpents: and there are four stars also, one, apparently, for each. We conjecture that these figures have a special reference to the four last days of the lunar month, that of Mecheir, now coming to an end: and this was a month of 29 days only; and these stars on this principle would be found actually attached to Phamenoth 4—7, September 9—12, the luna 26 to 29 inclusive. The Cynocephalus was certainly connected with lunar time: but what there was to make these four lunar days remarkable, except as ushering in the numenia of Phamenoth, the date of the embasis into the moon, we do not profess to know.

No. 31.

The four months of the preparatory nurture and suckling of the young Apis end here, and the fifth now begins. At this moment a figure meets us, sitting on the opening bud of a lotus; and it has three stars, two below it, and the other above its head, which is so different from the rest, that it may safely be left out of the account.

The date of the first star, reduced to the calendar, is the luna prima of Phamenoth, the 8th of the solar Phamenoth, September 13 B. C. 798. In the lunar style of the calendar it was the *νουμηνία* of Phamenoth: and consequently the date of the *ἔμβασις* of Osiris into the proper moon of the month in which the first natales were destined to be kept. We have already explained[x] that, in the mystical sense of his ritual, this embasis on the numenia answered to his conception, preparatory to his birth at the dichotomy, and to his maturity at the full, of one and the same moon, and within the compass of the same fourteen days.

Now in what manner could Osiris be sensibly represented

[x] Supra, vol. ii. 512. Diss. xiii. ch. ii. sect. ix.

in relation to this ἔμβασις, preparatory to a conception and a birth like this, except as the infant Osiris? And how as the infant Osiris, and at the beginning of his proper cycle, except as appearing again after an interval of disappearance; or as coming to life again after a temporary death? The figure before us in this instance is clearly a youthful figure; so much so that it might be mistaken (as indeed it has been[y]) for Ed-fou the god of the morning, Harpocrates the emblem of the winter solstice, or Horus the youthful sun: all which however are totally out of place and out of character here, and in this particular representation. But it is seated on the lotus, and on the expanded calyx of the lotus, (the lotus of the monuments is represented by sir Gardiner Wilkinson[y] as the nymphæa lotus;) and the lotus, from a natural property and characteristic of that flower, by virtue of which it closed of its own accord at nightfall, and opened again in the morning, and even sank under water so closed at night, and appeared again above water only in the morning, was well qualified to be a type of transition from one state to another, particularly of one from darkness to light, or from death to life; the type of a reviviscence, a coming to life again, a resurrection, or the like: on which account, no doubt, it was that it was made the symbol of daybreak*, and of the *sol novus*, returning to his former strength and lustre, after the temporary torpor and dimness of winter.

Theophrastus has thus described this property of the lotus in the river Euphrates[z]. Ἐν δὲ τῷ Εὐφράτῃ τὴν κωδύαν φασὶ καὶ τὰ ἄνθη δύνειν, καὶ ὑποκαταβαίνειν τῆς ὥρας μέχρι μέσων νυκτῶν, καὶ τῷ βάθει πόρρω· οὐδὲ γὰρ καθιέντα τὴν χεῖρα λαβεῖν εἶναι. μετὰ δὲ ταῦτα ὅταν ὄρθρος ᾖ πάλιν ἐπανιέναι· καὶ πρὸς ἡμέραν ἔτι μᾶλλον ἅμα (δὲ) τῷ ἡλίῳ φανερὸν ὑπὲρ τοῦ ὕδατος· καὶ

* Plutarch, De Iside et Osiride, xi: Οὐδὲ τὸν ἥλιον ἐκ λωτοῦ νομίζουσι βρέφος ἀνίσχειν νεογιλὸν, ἀλλ' οὕτως ἀνατολὴν ἡλίου γράφουσι, τὴν ἐξ ὑγρῶν ἡλίου γινομένην ἄναψιν αἰνιττόμενοι—De Pythiæ Oraculis, xii: Εἶτ' Αἰγυπτίους ἑωρακὼς ἀρχὴν ἀνατολῆς παιδίον νεογνὸν γράφοντας ἐπὶ λωτῷ καθεζόμενον.

y Egyptian Antiquities, part i. 38: cf. 47. Wilkinson, Second series, i. xiii. 410. 411. Cf. Bunsen, Ideographics, No. 376. B. i. App. ii. 522.

z Historia Plant. iv. cap. viii. §. 10. He says of the flowers of the lotus generally; § 9; Ταῦτα δὲ ὅταν μὲν ὁ ἥλιος (δύηται) συμμύει καὶ συγκαλύπτει τὴν κωδύαν· ἅμα δὲ τῇ ἀνατολῇ διοίγεται καὶ ὑπὲρ τοῦ ὕδατος γίνεται.

ἀνοίγειν τὸ ἄνθος, ἀνοιχθέντος δὲ ι ἐτὰναβαίνειν, συχνὸν δὲ τὸ ὑπεραῖρον εἶναι τὸ ὕδωρ[z].

We apprehend then that such is the meaning of these symbols here, Osiris sitting on the expanded calyx of the lotus, at the *ἔμβασις* upon the *νουμηνία* of Phamenoth: his mystical conception, in the person of a new type of his proper cycle, and his consequent reviviscence; preparatory to his birth on the first dichotomy of the same month. The idea is both ingenious and beautiful, and recommends itself to the taste and approval of the reader by its own propriety; and very probably it was first conceived and applied in this manner, in connection with the fable of the Apis.

No. 32.

The next figure, to judge from the hawk-nose which it exhibits, seems to be that of Horus, or the sun. It has two stars, one below, the other above; both of them taken into account; Phamenoth 10 and 11, Sept. 15 and 16. We do not profess to understand the meaning of this figure. The date however is remarkable as being the middle of the tropical Virgo; the 15th or 16th degree of that sign: and there might be some ceremony in honour of Horus on one of those days.

No. 33.

We meet with a singular figure here; an human body, seated, but without arms, and without an head: and instead of an head, two horns expanded from the trunk, at what should be the neck. Neither do we profess to understand this. It has three stars, the dates of which are Phamenoth 12–14, Sept. 17–19, the luna 5–7. We conjecture it had something to do with the transformation of Isis or Athor, as the cow, preparatory to the appearance of Osiris also shortly, in his correlative character of the bull.

No. 34.

The four headed bust of the Apis meets us next, and so closes the representation; which having set out from the two heads facing to the east has thus come round to the two facing the west. It is imperfect indeed in the plate from which we have taken the above details: but in Denon's plate it has four heads, each of them prominent and distinct. It has

[z] Cf. De Causis Pl. ii. cap. xix. § 1.

only one star; but this is remarkable; since it answers to the 8th of the lunar Phamenoth, the 15th of the solar, (Sept. 20) at the 6th hour of which the celebrity of the natales would begin. The celebration however is not represented in this tablet. The end which it proposed was answered, when the course of the ritual, beginning on the day after the birth, had been regularly conducted down to the day on which the natales must be supposed to have begun.

It is observable that over this figure and the preceding there are two rows of birds like geese, three in each row; and each row has a star behind it, as if intended to characterise each of the birds in the row alike. We do not pretend to understand the meaning of these symbols here; but having already learnt that a star may denote an hour, and the symbol of the goose any thing in its nascent or adolescent state; we should be much inclined to conjecture that these two rows of geese, (six in all,) and these two stars were meant of the first six hours of the day, at noon on which the natales themselves were wont to begin. And though this is a mere conjecture it is not without some foundation, if every hour may be regarded as the rudiment of a day; as a kind of imperfect or inchoate day.

Section IX.—*On the date of the circular zodiac.*

The reader has no doubt perceived that we have referred the whole of the above representation to one epoch, æra cyclica 3209 A. M. 3207 B. C. 798: and have found all its details agreeable to that hypothesis. This year, as we have seen, is remarkable. It was a new epoch in the theory and administration of the Phœnix cycle among the Egyptians, and in their astronomy generally. It was the date of the introduction of the judicial astrology of the Chaldees into Egypt: and that might have something to do even with the present representation, if traced back to its origin and to the circumstances out of which it arose.

With respect however to the question of its date in general; having only had reason to conclude that the symbols and notes which occurred upon it, in the shape of stars, were chronological, and intended for so many days; and also that the whole of the representation on the exterior circle had an

express relation to the Apis ritual and to the Apis calendar; then from the information which we had already acquired, relative to the details of this ritual, we should not have had much difficulty in discovering that the principal dates between the birth of the Apis and the first natales were recognised in this representation; the date of the birth itself, Athyr 10, the date of the close of the first 40 days after the birth, Chœac 20, and the date of the natales or installation, Phamenoth 15. And these facts having been ascertained, it would necessarily have followed from them that no part of this representation could have been adapted to the third type of the Apis cycle, of the epoch of Mesore 30 Nab. 441—442, B. C. 306: nor to the second type, of the epoch of Epagomene 5 Nab. 225—226, B. C. 523—522: nor in fact to any state of the Apis calendar and Apis cycle, except that of the first type, of the epoch of Thoth 11 æra cyc. 3034 B. C. 973. The lunar numeniæ in this representation, falling out critically on Athyr 10, Chœac 10, Tybi 9, Mecheir 9, and Phamenoth 8, could have left no doubt that the first of all must have fallen on Thoth 11: and consequently that the representation could have been adapted only to the first year in some cycle of type 1, between æra cyc. 3034 B. C. 973, the date of that, and æra cyc. 3484 Nab. 225—226, B. C. 523—522, the date of the second type.

In order however to advance further than this in the determination of the actual date of the representation, some third term would still have been necessary in the shape of a Julian date, the agreement of which with some one of the Egyptian dates, furnished by the representation itself, was capable of being ascertained. And though even one such term would have sufficed for the purpose, the reader cannot fail to have observed that we have brought no less than three or four to light; the Julian date of the summer solstice of Mazzaroth, represented by Chœac 17 June 24; the Julian date of the true summer solstice, represented by Chœac 25 July 2: the Julian date of the Heliacal rising of Sirius in the first year of the Sothiacal cycle of leap-year, July 22, represented in like manner by Tybi 15; and the Julian date of the genitura mundi according to the principles of the Chaldee astrology, in the first year too of its proper cycle

of leap-year, August 8—similarly represented by Mecheir 2. There is but one year in which these different dates could all have met both in the equable and in the Julian style of such things: and that year æra cyclica 3209 A. M. 3207 B. C. 798. Among these coincidences, the most striking and critical no doubt are the two last; and in particular the first of those two. For July 22, as we have proved at large in the preceding part of our work[b], was the true date of the Sothiacal period, and of the heliacal rising of Sirius to which it was at first attached; but only in the first year of its proper cycle of leap-year: that is, only in such a year as B. C. 798. B. C. 799, one year before this, it must have been July 21: and B. C. 797, one year after this, it must also have been July 21.

The true date and true age of the representation then being pointed out and authenticated by such coincidences as these, totally independent of the symbolical representation contained in the oval which exhibited eight figures in the act of adoring the infant Apis; they must be considered to confirm the construction which we put on that representation: viz. that by that one circular oval, and by the eight figures included in it, all similarly engaged in the performance of the same act of service to the same object of worship, the new type of a new cycle; eight Apis cycles, or cycles of the same kind, each of which in its proper order of time had its type of the same kind and its service, and ministry of the same kind, were purposely intended: which being admitted, it follows that the cycle then current, the cycle just begun, the cycle, to which the whole of the representation, until then exhibited or about to be afterwards exhibited, was to be understood to belong, must have been the *eighth* from the epoch, Thoth 11 æra cyc. 3034, May 1 B. C. 973: the cycle which began to be current Thoth 11 æra cyclica 3209, March 20 B. C. 798. And thus the question of the true date and true age of this representation would be at once decided, and by its own testimony.

There is another significant intimation of its date, furnished by the interior circle; which we think it proper to mention, though we do not think it necessary to insist formally upon it.

[b] Diss. xiv. ch. ii. sect. vi. and vii.

The representation, as we have seen, stopped short with the first day of the natales Apidis, Phamenoth 15 Sept. 20: but if it had included the whole of that ceremony, it must have extended to Phamenoth 22, September 27; from the 8th of the lunar Phamenoth to the 15th: and between these extreme dates, the middle one may be assumed as Phamenoth 18, September 23, the luna 11.

Now September 23, as we have seen, was the stated date of the autumnal equinox in the sphere of Mazzaroth[c]. Let the reader then turn his attention to the sign of the Balance, as it is represented within the interior circle in its place in the order of the zodiac. Just in the middle of the scales on the top he will perceive the outline of a circle; which is not so round as a circle ought to be, nor in that respect like other circles which appear in the representation: but it is such as would suit the appearance of the moon about half way between the first quarter and the full, in that state of the phasis to which the Greeks gave the name of ἀμφίκυρτος, and which we call gibbous; when one of the edges of the lunar disk is round and entire, but the opposite one is partially indented, and flattened. In the midst of this circle here too a youthful figure may be discovered sitting; and, in baron Denon's delineation of the cieling, seated here also on the opening calyx of the lotus: though that image does not appear in Champollion's representation. On this principle, it would be altogether analogous to the figure which we have described in No. 31—connected with the date of the ἔμβασις, on the first day of the lunar Phamenoth. And it would be difficult to say why this same figure should have been transferred from the date of the ἔμβασις, and from the luna prima of that month, to the middle of the Scales, to what must be considered the very first degree of the sign of Libra, yet have been inclosed in a circle, corresponding to the appearance of the moon ten or eleven days old; if it was not intended thereby to be intimated that the ingress of the sun into Libra, in some sense or other, coincided in this instance with the natales Apidis, with the period during which Osiris must be regarded as born indeed but not yet arrived at maturity: with the *luna undecima* in short of the same month of

[c] See Diss. xv. ch. iv. sect. viii. vol. iii. 305.

which the ἔμβασις coincided with the *luna prima*. And though this was not possible of the ingress of the sun into the Libra of the tropical sphere B. C. 798; yet as we have shewn it would actually be the case that year with its ingress into the Libra of Mazzaroth, September 23.

Moreover, on this circle itself, so situated in the centre of the beam of the Scales, the figure of an animal, resembling a fox, may be perceived; which is consequently that of the jackal of the monuments, the type of the Egyptian Anoub. The presence of this animal on the sphere is an infallible argument of a cardinal point; and properly of one of the equinoxes: from which circumstance it derived its hieroglyphical name of the "Hophioue," or "seated in the paths of the sun[d]." The tail of this jackal is turned to the Scorpion; and therefore it is looking contrary to the order of the signs, *in antecedentia* not *in consequentia*: but such is the apparent motion of the sun too in opposition to that of the earth, contrary to the order of the signs; and this jackal must always precede the sun.

Moreover on the left of this figure in the circle, which stands over the beam of the Scales, there is a miniature figure of an ox, which may obviously have been intended of the young Apis, now grown up to a bull; but still a young one. In Denon's representation of this part of the group, a figure with the head of a ram (and therefore resembling the Egyptian Noub or Kneph[e]) is supporting this miniature Apis on a kind of παστὸς, such as the Egyptians used to carry the images of their gods in procession; and from which a certain class of ministering priests were called παστοφόροι. In Champollion's delineation we have the same objects, but the miniature Apis stands alone, and unsupported. Still it is to be seen even there, close by the end of the Scales, on the right of the spectator; and we cannot but look on that position as significant: particularly if referred to B. C. 798, and to the actual state of the case that year, when the natales Apidis, the ceremony at which the Apis would first be recognised in this capacity, began and ended so near to the entrance of the sun into Libra.

d See supra, p. 228. Diss. xvii. ch. iii. sect. iii.
e Ibid. p. 239. Diss. xvii. ch. iii. sect. iv.

SECTION X.—*Synopsis of the dates discovered from the above representation, in connection with the Apis cycle.*

We do not hesitate therefore, on the strength of so many coincidences, to conclude that the date of this representation, (the date to which it is adapted throughout,) must have been the eighth Apis cycle, æra cyclica 3209 ; when the first of Thoth fell on March 9 at 18 hours, by the primitive rule, on March 10 at midnight, by the Julian, B. C. 798 ; and therefore the 11th of Thoth, the proper Apis date in the first year of the cycle, type i, fell on March 20 at midnight : and that the final end of the representation, (of that part of it at least which is contained in the outer margin distinct from the zodiac,) was to exhibit so much of the ritual and so much of the chronology of the Apis calendar, as was comprehended between the birth of the Apis and the first natales, in the first year of the cycle; in the first 125 days of the cycle, four lunar months and eight days in all. And as it confirms a variety of dates which we had already discovered, and brings others to light with which we were not before acquainted, we think it proper to collect them all together, and to subjoin them here; before we pass to any remarks on the remainder of the representation.

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i. Date of the conception of the Apis, the full moon of Tybi, the second lunar month in the last nine months of the cycle; in type i the solar Mecheir 4 perpetually.

ii. Date of the birth, the luna prima of the third month in the first year of the cycle; the 10th of the solar Athyr, type i.

iii. Period of uterogestation, in the case of the Apis; from the conception to the birth, exclusive of both extremes, 280 days.

iv. Date of the recognition and notification of the birth of the Apis, the day after the birth, the luna secunda of the third moon, Athyr 11, type i.

v. Stated date of the end of the 40 days' privacy after the birth, the luna 11[a] of the fourth moon, Chœac 20, type i.

vi. Stated date of the Ἔμβασις εἰς τὴν σελήνην: the luna prima of the seventh moon; the 8th of the solar Phamenoth, type i.

vii. Stated date of the natales; the luna octava of the seventh month; the solar Phamenoth 15 at noon, type i.

viii. Date of the Isia, Athyr 17.

ix. Date of the production of the cow of Mycerinus, Athyr 18, the second day of the Isia.

x. Date of the εὕρεσις, Athyr 20.

xi. Stated date of the summer solstice, or first of Karkinon, in the sphere of Mazzaroth, June 24.

xii. Date of the true summer solstice, B. C. 798, July 2.

xiii. Stated date of the heliacal rising of Sirius in the first year of the Sothiacal cycle of leap-year, July 22.

xiv. Date of the genitura mundi, or Babylonian cosmogony, August 8.

xv. Date of the sacrifice of the pig at the full moon, in the first year of the viiith Apis cycle; the full moon of the sixth lunar month, the lunar Mecheir.

xvi. Date of the autumnal equinox, or 1st of Zygon, in the sphere of Mazzaroth, September 23.

SECTION XI.—*On the interior circle of the sculpture, or zodiac properly so called.*

We must now proceed to offer some remarks on the interior, in contradistinction to the exterior, division of the representation in general; that which contains the zodiac properly so called, and the zodiacal figures.

i. In the centre of this division appears a Typhonian figure, having the head and legs and belly of an hippopotamus, but the right human arm and hand; which as here exhibited is resting on the handle of a sword, the blade of which is pointed downwards. The usual explanation of this figure makes it a representation of Thuoëris or Te-oër, a female conception, which the Egyptian version of the fable of Osiris and Typhon[f] set forth as the wife or concubine of Typhon; who

[f] Plutarch, De Iside et Osiride, xix.

nevertheless in his contest with Horus forsook him, and went over to the latter. Concerning the probable true meaning of this particular figure, and why it was here introduced, so near to the centre of the representation, we have said something in the note *; to which we refer the reader.

* In the chevalier Bunsen's list of Ideographic Symbols, p. 502, No. 82, there is a figure of this kind, described as an hippopotamic goddess, with the head of a lioness: and p. 516, No. 278, there is an hippopotamus, with a crocodile's tail, standing, and holding what is called a cravat; designated by the name of Ta-hur or Thoueris.

Concerning this Te-oër or Thuoëris, Egyptian Antiquities, part i. p. 41, Mr. Birch writes thus: "Her titles are 'Resident in the centre of the pure waters belonging to the abime of the heavens, regent of the gods'....Her most conspicuous situation is in the abime of the heaven; resting her hand on a sword, and with a crocodile looking up to her." Her hieroglyphical name is said to read as "Isis, the established mother of the panegyry of the heaven;" and in this sense, according to Mr. Birch, "she is found on the astronomical cielings of the Memnonium at Thebes, and in the Roman temples of Denderah and Esneh, close to the cow in which the birth of the sun took place."

If Mr. Birch, by this last allusion, means the place of this figure on the zodiac which we are considering, it is not correct to say it is close to the figure of the cow, lying in the boat, and with the star between its horns; which must be what Mr. B. intends by the cow which brought forth the sun. That cow is a great way off from this hippopotamic figure. Its proper position is close to the leg, which we have supposed to denote the *κέντρον κινήσεως* of this representation; and that may be the abime of the heaven, alluded to by Mr. Birch, in the sense of the zenith or meridian. But it stands still nearer to the sign of the autumnal equinox, and to the jackal mounting the stage there; and all three are so situated, relatively to the vernal equinox, that a line, drawn from the middle point of the beam of the balance through the middle of this hippopotamic figure, would pass by the head of this fox or jackal to the head of the ram at the vernal equinox.

It is not without a meaning, in all probability, that these figures, though extra-zodiacal themselves, were thus disposed relatively to the two principal points, the autumnal and the vernal equinox. In our opinion, the hippopotamic figure in question had a special relation to the first half of the period at least, from the autumnal to the vernal equinox; during which the waters of the Nile were subsiding, the seed was in the act of being committed to the ground, and vegetation was actively going on every where. It was the habit of the hippopotamus to live in the waters of the Nile, especially when the river was low: and this may be the ultimate foundation of the title of this goddess, as "Resident in the centre of the pure waters." But the hippopotamus was a destructive creature also; especially to the vegetable crops, both the adolescent and the mature: for which

ii. Close to this Typhonian figure, (on the right as contemplated by a spectator facing it,) is another jackal or dog of Anubis, the doorkeeper of the path of the sun, and here evidently represented in that capacity; since he is mounting a kind of stage, the direction of which is upwards. Next to

reason, it was sacred to Typhon; (Plutarch, De Iside et Osiride, l.;) and there is a destructive or Typhonian character about this figure too, as appears from the sword which it holds in its hand: though the point of this being directed downwards, it is probably implied thereby that its effect was produced underground.

It is manifest however that she is represented as pregnant also; that the unusually large and prominent form of the belly can be intended only of that of an animal great with young. If so, there must be also a character about it the opposite of destruction, and more allied to conservative: a character of productiveness or reproduction: in which capacity she must be regarded as pregnant with the seeds of life, the embryos of future existence. It could be only as contemplated in that point of view that she could ever have been identified with Isis, the great mother of all existence, the *magna parens* herself. In this point of view, Egyptian fable represented her as Ta-pur, Te-oër or Thuoëris, once the concubine of Typhon, but who deserted him for Horus, the son of Osiris and Isis; and we must suppose betrayed to Horus the secret of the concealment of the body of Osiris also. Now the concealment of Osiris being nothing after all but the burial of the seed in the ground; his discovery could be nothing but the appearance of the plant above ground at last: and as both these processes were alike going on in Egypt during the whole of the autumnal season; to attribute the discovery of Osiris at last to this Thuoëris was to make her in some manner or other the instrument or cause of this production of the plant from the seed: in other words, of the principle of vegetable life as well as of vegetable death, and of both on a great scale, one commensurate with the other. We shall meet with this hippopotamic figure again, in the zodiac of the portico, in connection with the sign of the Scorpion; that is, just at the beginning of that season of the natural year which was specially appropriated both to the principle of vegetable destruction, as affecting the seed, and to that of vegetable reproduction, as affecting the plant; consequently to Typhon and to this Thuoëris his partner: who nevertheless abandons him at last for the son of Osiris; but only just at the time when the contest between vegetable life and vegetable death is about to be terminated by the final and complete ascendancy of the former, which must sometime or other take place in the course of every year. The proper relation of this figure then on the circular zodiac would seem to be to the sign of Scorpio more than to any thing else. And that sign is not far off from it; and this figure might be intended to stand for its decan: especially as it turns out that, unless so represented by this figure, the sign of Scorpio on the circular zodiac has no decan at all; though every other sign has one or more.

this, on the right also, is the forethigh and foreleg of an animal with a cloven hoof, (in baron Denon's delineation it is the hind thigh and leg,) which may be intended, and probably is, of the foreleg of a ram; and therefore may make a part in this instance of the zodion of the Ram. And just behind the knee of this figure, there is the head and neck of the jackal of Anubis again. The intention of this combination of figures in the centre of the cieling, especially of this leg and this jackal, in all probability was to designate the *κέντρον κινήσεως*, the *primum mobile*, the *punctum saliens* of the whole of the representation in the midst of which it appears; that is, the first point of Aries, denoted by the advancing foot, the first *βῆμα* or spring of the Ram, piloted and guided on his way by the jackal of the sphere, the opener of the gate of the year, the porter of the door of the sun.

iii. Accordingly parallel to the thigh of this leg, and looking the same way as the jackal behind, there are two figures, either two jackals also or a jackal and a cynocephalus, with their backs one to another; and consequently one facing one way and the other the opposite way: and over the cynocephalus there is an hawk, crowned with the pschent; and under the foot of the cynocephalus is the symbolical eye of the sun [g]: and underneath the whole of this group of figures we have the zodiacal ram, couching indeed, but with one foot stretched out, as if in the act of getting up, in order to begin to move forwards; and with its head so turned as to be looking behind it, and away from the bull which is next to it on the right.

This peculiar combination of the hawk, and two jackals or two cynocephali, was familiar to Clemens Alexandrinus. He has given the following account of it [h]: Ἤδη δὲ κἂν ταῖς καλουμέναις παρ' αὐτοῖς κωμασίαις (exodes of the gods, or processions in public,) *τῶν θεῶν χρυσᾶ ἀγάλματα δύο μὲν κύνας ἕνα δὲ ἱέρακα καὶ ἶβιν μίαν περιφέρουσι, καὶ καλοῦσι τὰ τέσσαρα τῶν ἀγαλμάτων εἴδωλα τέσσαρα γράμματα.*

Εἰσὶ γοῦν οἱ μὲν κύνες σύμβολον τῶν δυεῖν ἡμισφαιρίων, οἷον περιπολούντων καὶ φυλασσόντων· ὁ δὲ ἱέραξ τοῦ ἡλίου, πυρώδης γὰρ καὶ ἀναιρετικός· αὐτίκα τὰς λοιμικὰς νόσους ἡλίῳ ἀνατιθέα-

[g] Egyptian Antiquities, i. 41. cf. 31: 43, 44. [h] Strom. v. vii. § 44. p. 32. l. 6.

σιν· ἡ δὲ ἶβις σελήνης, τὰ μὲν σκιερὰ τῷ μέλανι τὰ δὲ φωτεινὰ τῷ λευκῷ τῶν πτίλων εἰκαζόντων.

*Εἰσὶν δ' οἳ τοὺς μὲν τροπικοὺς πρὸς τῶν κυνῶν μηνύεσθαι βούλονται, οἳ δὴ διαφυλάσσουσι καὶ πυλωροῦσι τὴν ἐπὶ νότον καὶ ἄρκτον πάροδον τοῦ ἡλίου. τὸν δ' ἰσημερινὸν ὑψηλὸν ὄντα καὶ διακεκαυμένον * ὁ ἱέραξ δηλοῖ, καθάπερ ἡ ἶβις τὸν λοξόν· ἀριθμοῦ γὰρ ἐπινοίας καὶ μέτρου μάλιστα τῶν ζώων ἡ ἶβις ἀρχὴν παρεσχῆσθαι τοῖς Αἰγυπτίοις δοκεῖ, ὡς τῶν κύκλων ὁ λοξός* †.

We have all these figures in the present instance, except that of the Ibis; and the omission of that is significant, if its presence would have implied some reference to the moon. We have no doubt that the hawk exhibited here is the type of the sun; but of the sun, in this instance, at the equinox; of the sun about to commence its annual journey among the signs from the equinox of spring: and that the two jackals, or two cynocephali, combined with it, are the types of the two hemispheres, the north and the south, which comprehend the heavens between them. Consequently one of these cynocephali or jackals is looking one way, contrary to the order of the signs; and therefore it is that of the southern hemisphere, which the sun is just on the point of leaving: and the other is looking the opposite way, according to the order of the signs; and therefore it is that of the northern hemisphere, which the sun is preparing to enter.

The meaning then of these symbols, thus grouped together about the first of the signs of the zodiac, appears to be this: That the mystical circle of the heavens, which otherwise would have neither beginning nor end, in reality sets out from this point, and in reality returns to this point perpetually: that this is the point of the junction of the two great divisions of the sphere, the upper or northern and the lower or southern: that this is the door or gate, through which the symbolical eye makes its annual exit, and to

* What Clemens here observes of the equinoctial circle, as the hot one *κατ' ἐξοχήν*, is calculated to illustrate the distinction to which we referred, supra, p. 229, of the greater and the lesser heat; the former beginning at the vernal equinox, the latter at the autumnal.

† This implies that the first and earliest use which men were supposed to have made of numbers was in the division and distinction of the ecliptic into signs and degrees.

which it returns at the end of the year, perpetually: that here the celestial ram is always couching, yet with his fore feet in one direction, to intimate the real motion of the sun among the signs, and with his face in another, to indicate its apparent motion contrary to the order of the signs.

iv. Under the ram, between it and the exterior border of the circle of which we have already given so full an account, are two figures, one of them human in all respects, the other with the head of the cynocephalus. In Denon's representation both have the head of the cynocephalus. They are clearly extrazodiacal; i. e. they make no part of any one of the zodia. But they have no doubt a connection with the signs or with the zodia; and in this instance with that of the Ram. In our opinion they are to be regarded as stated attendants on the sign of the Ram; as the decani of the Ram. They bear the koukoufa sceptre or staff in their hands; which is so far a token of their divinity: Ὅθεν καὶ τῶν θείων σκήπτρων κουκούφα προτίμησίς (lege πρότμησίς) ἐστιν[k]: the koukoufa being a bird, the emblem of gratitude. The hieroglyphical name of this sceptre is *tam;* and it is explained to be the emblem of power[l].

v. Next to the Ram, and with his horns under the head and chest of the Ram, is the celestial Bull; his impulse or spring in one direction, his eyes and his look in another. There is no disk about this Bull; so that it cannot be considered here in any sense the type of the Apis, though it may be as that of the sign. Under the Bull too is an extrazodiacal figure, carrying a koukoufa sceptre in one hand, and a flagellum or whip in the other, and having a cap like the upper crown or *Het;* and behind it, close at its heels, a small animal of some kind, which in the baron Denon's copy is made to look like a bird. We should consider this figure too to be one of the decani of the sign of Taurus.

vi. The sign of Gemini being next to that of Taurus, we ought to find the zodion of Gemini next in order also: and it is very evident that between the Bull and the Crab, in this representation, there are four figures, two of which, those in the middle, are holding each other by the hand. In the zodiac of the porch, and in the parallel place of that zodiac,

[k] Horapollo, i. 55. [l] Cf. the chevalier Bunsen, book i. app. vi. A. p. 368.

we meet with the same two figures, holding each other by the hand also. We cannot doubt therefore that these two figures are the proper Gemini of the Egyptian sphere, the *two* κατ' ἐξοχὴν, their Osiris and Isis: and that this was the manner in which they were originally represented upon it; viz. by a male and a female figure, holding each other by the hand. The figure which stands between them and the Bull, and apparently on the tail of the Bull, is extrazodiacal: but as in attendance upon this zodion, or on that of Taurus, it is probably a decan of Gemini or of Taurus. The same observation may be made on the figure which stands next to these two, bearing a koukoufa sceptre. That too is probably one of the decani of Gemini.

vii. The zodion of the Crab comes next in order; and over against it, between it and the Lion, is a small figure seated, with a staff or rod in its hand; in all probability one of the decani of Cancer.

viii. The Lion is next represented, standing on the back of an hydra or water-snake: and on the tail of the Lion there is a diminutive human figure, which in Denon's copy resembles a cynocephalus; and in our opinion was most probably intended for something of that kind. A lion an hydra and a dog, according to Macrobius[l], were so represented in the temple of Sarapis; yet all symbolical of the sign of Leo. And in this combination the hydra was the type of the Nile[m], which overflowed and inundated the country in this sign. Above this figure on the tail of the Lion, and between the Crab and the Virgin, is another extrazodiacal figure, with the koukoufa sceptre, and with a star over its head; which also we should consider to be meant for the principal decan of Leo. On the tail of the hydra too, and facing in the opposite direction, there is the image of a bird of some kind; the occurrence of which here we do not profess to explain, unless it is intended for the quail, sacrificed, according to custom, before the heliacal rising of Sirius.

ix. Next to the Lion is a figure holding an ear of corn in the left hand. Consequently, the zodion of Virgo; into which the spica or ear of corn, it seems, had been already introduced, B. C. 798. There is a figure behind the Virgin,

[l] Vol. iii. 585. [m] Vol. iii. 285.

which we have already mentioned[n], as carrying in Denon's copy the image of the miniature Apis: and this is probably a decan of Virgo.

x. The sign of Libra follows next; represented by a pair of scales. Of the circle in the middle of this on the top, and of the jackal on that, we have already given an account[n]. Over the jackal is a small figure seated; and next to the circle behind is an hawk-headed figure seated also, having the solar disk on its head and the koukoufa sceptre in its right hand. These appendages appear intended to point out this sign as one of the most important in the year; the *ἀντίστοιχον* of the vernal equinox itself: of which even Horus and Anubis might be the decani in particular. It thus appears that the emblem of the Scales had been already introduced into the sphere; and most probably in B. C. 848 itself. Yet it would not follow from that fact that the original name of the sign, or even the original type taken from the *χηλαὶ* or claws of the scorpion, must necessarily have been laid aside.

xi. The next figure is that of the Scorpion, shorn however of its claws; which in this representation are of the ordinary size and proportion. This sign or zodion, it is observable, has no appendages in the shape of decans, discoverable at least; unless as we have already conjectured, (supra note at page 332) one of these is the hippopotamic figure, which we began with describing.

xii. The Sagittarius or Hippocentaur comes next; a winged figure in this instance as well as a quadruped, and discharging an arrow; to the supposed speed of which it was probably expected to add by this addition to the figure[o]. Behind it, and standing over the rump of the horse, is either a goose or a crane: in Champollion's delineation, a goose, apparently in the act of feeding; in Denon's copy, something more like a crane. The goose might be the type of infant vegetation; which in the month corresponding to Scorpio would be every where beginning to appear. There is also, connected with this zodion, and over the goose, a figure bearing a sceptre, or a phial, in its left hand; probably one of the decans of Sagittarius: and if he really holds a phial

[n] Supra, p. 328. [o] See vol. iii. 390.

in his hand, and that an empty one, it might be intended to denote thereby the subsidence of the Nile in this sign.

xiii. The sign of Capricorn follows; which here too is made up of the head and neck and fore-quarter of the goat, and of the body and tail of a fish. The goat is represented as if in the act of rising; with one foot stretched out: and that might be purposely intended to symbolize the natural phenomenon of the sun's beginning to mount higher in the air in this sign. Above the back of this zodion is the hawk-headed figure of Horus, carrying a koukoufa sceptre, and having a star over his head; and above that too a goose, as before apparently in the act of feeding, and another bird of a different kind. The decan of Capricorn would thus be Horus himself. The goose might be an emblem either of the infant sun in this sign, or of infant vegetation, still continuing to manifest itself in this month.

xiv. The sign of Aquarius comes next to that of Capricorn; and therefore the zodion of that sign ought to be found here. If we follow the direction of these signs from Capricorn to Pisces, neither of which can be mistaken, midway between them, and consequently in the proper place in which the representative of Aquarius should be found, we discover an human figure holding an animal by the ear with the left hand, and grasping a club with its right: and this being exactly the mode in which the type of the sign of Aquarius was represented in an authentic instance of the kind, which we have already considered[p], the same thing must be intended by the representation here; the sacrifice of Horus to the sun: the victim in which was the oryx, the only kind of animal, as we are informed, found on the monuments in the act of being sacrificed, yet specially connected with the sign of Capricorn and of Aquarius too[q]. The animal, which is in the act of being so sacrificed here, is standing apparently on the back of some other animal which has lost its head; and therefore it cannot be exactly known what it was intended for. The symbol of Anubis, in his capacity of Hophioue, might have come in here, as one of the decani of Aquarius: or the figure of a lion, divested of every attribute which

[p] Vol. iii. 408. Diss. xv. ch. vi. Sect. xii. [q] Wilkinson, Second series, ii. xiv. 188, 189. Egyptian Antiquities, part i. p. 54.

would have set it forth as fierce and intractable; one of the accompaniments of Horus.

xv. Lastly, we have the sign of Pisces, and the two zodia, proper to this sign, the northern and the southern fish, connected together by two lines drawn from the tails of each, and meeting in an angle, and enclosing between them the usual hieroglyphical symbol of water; a tablet, with three rows of wavy and parallel lines upon it, resembling the undulatory motion of water, or of any other fluid. Those fish, being so connected, are virtually made one; the reason of which might be that they were the types of the same world in two different states of its being, the world before and the world after the flood: and they have the symbol of water between them, to imply that each of these worlds was produced from water, the world before, from the waters of chaos, the world after, from the waters of the flood. Between the sign of Capricorn too, and that of Pisces, under the zodion of Aquarius, there are two extrazodiacal figures; one of which (that next to Capricorn, and under Aquarius) has two phials in its two hands, from which water is running in a copious stream. This is probably the decan of Aquarius; from the idea of which the symbol of Aquarius itself might ultimately be derived. The other has the koukoufa sceptre, and a star over its head; and it is probably the decan of Pisces.

It thus appears that each of the signs of the zodiac, and under the usual emblems, exactly as they have descended to the present time from the last revision of the sphere, may be recognised in their natural order on this circular planisphere of Denderah; with one exception only, that of the sign of Aquarius, and of the symbol by which it is represented at present. We must conclude then that this emblem had not superseded the original zodion of Aquarius at the time to which this representation relates; which as we have seen is B. C. 798: or that if it had, yet for some reason or other, it was not thought proper to substitute it for the other here. The figures themselves in each instance are rude, and sometimes even grotesque; and besides the deterioration which they have undergone from the effects of time, they do not appear to have had much of an artistic finish and execution to characterise them even from the first: but this in our

opinion is an implicit argument that the representation itself is either an original of great antiquity, or a faithful copy of a much more ancient original. As to the figures intermixed with these zodia, they are evidently in no instance astronomical or even zodiacal. They have no connection with groups of stars which might be mistaken for constellations. Only five have a star over or near to them; the meaning of which even in that position and in that relation may obviously be simply to point out some particular day, or some particular service, connected with these objects. They have the dress and coiffure and other badges of Egyptian divinities; particularly the koukoufa sceptre, or rod, (*ῥάβδος* in general,) which was an usual badge of any thing esteemed sacred among the Egyptians, as their temples, and their gods. Hence it is that we read in Eusebius, from Artapanus[r]: *Διὰ τοῦτο δὲ καὶ τοὺς Αἰγυπτίους τὴν ῥάβδον ἀνατιθέναι εἰς πᾶν ἱερὸν, ὁμοίως δὲ καὶ τῇ Ἴσιδι· διὰ τὸ τὴν γῆν εἶναι Ἶσιν, παιομένην δὲ τῇ ῥάβδῳ τὰ τέρατα ἀνεῖναι*: and in the Scholiast on Apollonius Rhodius[s] while the zodia were called *θεοὶ βουλαῖοι* by the Egyptians, the planets were called *ῥαβδοφόροι*. In our opinion, these extrazodiacal figures, accompanying the signs but distinct from them, are meant of the decani of the signs; and probably of an older scheme of decani than that which the Egyptians borrowed from the Chaldæans, and more properly Egyptian. On which supposition we shall have discovered fifteen here represented in all; two in Aries, one in Taurus, two in Gemini, one in Cancer, two in Leo, one in Virgo, two in Libra, one in Sagittarius, one in Capricorn, one in Aquarius, and one in Pisces. Scorpio would thus be left without a decan, unless in the shape of the Hippopotamus figure of Thuoëris above described. But it should be remembered that Scorpio originally comprehended Libra; and Libra has two: both of which might once have belonged to Scorpio.

Besides the figures however which we have thus described, there are five of which no account has yet been given; but which still remain to complete the description of the interior. It is peculiar to these to stand by themselves, between the zodiacal circle and the border circle. One is a female figure,

[r] Præparatio Evangelica, ix. 27. § 32. p. 402. [s] iv. 262.

discharging an arrow: the next is a female figure also, sitting, crowned with a chaplet of lotus flowers, and holding in her hands aloft two empty phials, from which the water has been poured out. The third also is a female figure, sitting, holding a child on the palm of her left hand, and having her right hand directed to its head or its mouth, as if in the act of feeding it. The fourth is a ram-headed figure, with a scythe in its two hands. The fifth is a lion, couchant, with the same figure as before on its tail, towards which its face is directed, and with the emblem of water under its fore-paws.

We cannot help suspecting that in these five figures, represented as they are, and placed where they are, not as signs nor as decani of signs and yet in some manner or other connected with the signs; we have exhibited to us the most ancient and the most curious part of every thing which is depicted on this cieling. These figures were probably placed here, along with every thing else relating to the zodia of the sphere, yet as distinct from the actual zodia of the sphere, because they represented the first attempts of the Egyptians at this mode of characterising the signs by sensible images. They were the expression of their first ideas of that kind; which, though not retained to the last nor ultimately adopted, it might yet seem desirable to perpetuate in this manner, along with those which were adopted and consigned to the sphere. And it is easy to explain them on this principle.

For example, the first, the figure of the archer, might indeed at first sight be taken for Neith, who is often represented with a bow and arrows[t], or for an Egyptian goddess called Seti[t], and in the Coptic Sate; whose name was derived from the Egyptian term for an arrow or for a sunbeam. But who shall vouch to us for the antiquity of this Seti? We are well assured that no such goddess could possibly be as old as the time of this business of first giving names to, or first inventing emblems for, the signs of the zodiac. Is it not much more reasonable to conjecture that the bow and the arrow, or the archer simply, was the first idea of the Egyptians for the sign of Sagittarius; in order to express by a

t Chevalier Bunsen, b. i. App. vi. A. 381: 385, 386. Egyptian Antiquities, part i. p. 11, 12.

sensible image the rapidity of the sun's motion in that sign? an idea which they afterwards changed for that of the horse and the archer, or of the hippotoxotes in the shape of the Centaur; a much more significant emblem with such a meaning.

ii. The figure with the two phials might have been the first idea of the proper mode of representing the sign of Virgo, in which the inundation had attained to its maximum, and there was no longer any increase in the amount of the waters; that is, the waters ceased to rise, and the phials must therefore be represented as empty. The crown of lotus flowers too would connect it in a significant manner with the season of the waters. The figure itself might be intended at first of the land of Egypt or of Isis. At any rate, it was an obvious modification of such an image at last to make it the type of Virgo—in the sense in which we have explained it as the representative of the sign.

iii. The figure of the lion, with the symbol of water under its fore-paws, might always have been intended of the sign of Leo; but with a special reference to the inundation, which begins to attain to its maximum in Leo; overflows the country at least in Leo.

iv. The figure, sustaining the infant and apparently suckling it, might be Isis with the young Harpocrates, either as the type of the winter solstice, or as that of infant vegetation; in both which senses this type of Harpocrates is explained by Plutarch[u]. He tells us also that it was in this manner, viz. by putting her finger in its mouth, that Isis fed the infant child of the king and queen of Byblus[w], when she was a wanderer still in search of the remains of Osiris.

v. And lastly, the vernal equinox being the natural season of the first of the two harvests in Egypt, barley-harvest; the ram-headed figure with the scythe might have been considered a very proper symbol for the sign of the Ram, in which the work of reaping thus began.

We see then that, on this principle, each of these figures too would have a meaning; and such a meaning as to connect them with the sphere and the zodia, and to account for their being introduced into this zodiac of the cieling, into which

u De Iside et Osiride, lxv. lxviii. w Ibid. xvi.

every thing appears to have been introduced, which was known to have been in any way connected with the signs and with the zodia from the first; and yet for their all being placed by themselves notwithstanding. It would be observable too on this principle that, in every instance but the first, the proposed symbol of the sign must have been derived from some natural characteristic phenomenon of the month corresponding to the sign. It is observable also, that these signs, which it seems to have been proposed to characterise in this manner and first of all—Aries, Leo, Virgo, Sagittarius, and Capricorn—could not have been continuous ones; nor, except Aries and Capricorn, equinoctial or solstitial ones.

SECTION XII.—*On the zodiac of the portico.*

It is to be regretted that the great work, of which we have hitherto made use in our remarks on these sculptures of Denderah, does not contain the zodiac of the portico. To illustrate therefore what we have to say about this, and as the text on which our reasonings require to be founded; we must be content to refer to the copy of the baron Denon[x]. His accuracy however, in such delineations as these, has never been called in question: and on these two in particular it would appear that he bestowed peculiar pains; having made, as he tells us himself, *twenty* journeys at different times in order to copy them, and having taken as exact a copy of every thing as he could.

This representation is called the zodiac of the portico, because it was originally sculptured and painted on the cieling of the portico of the great temple at Tentyris; and that being an oblong building, supported on 24 columns, the roof and the cieling were oblong too: which circumstance determined the division of the zodiac into two equal and parallel but oblong bands, one of them occupying the right, the other the left, compartment of the cieling. Both of these have suffered from the effects of time, but the left more so than the right; a large portion of the stone-work of the former having come away, and with it part of the zodiacal figure of Leo, and of its accompaniments. To the minuter

[x] Pl. cxxxii. See also plate iv. at the end of this volume; a facsimile of this zodiac from Denon; though for the sake of convenience divided into two parts.

details of the representation the ravages of time have been still more injurious: yet notwithstanding all this, it has pleased the Divine Providence that the principal and most important part of the original should survive to our own time, and be made subservient (as we trust under his blessing it has been, and still will be) to the cause of his own truth against all the scepticism and all the impiety of our own day also. And if the accuracy of the baron Denon's copy as far as it goes may be implicitly trusted, there is sufficient even in that to answer our purpose; and to shew that the testimony of this part of the sculpture, rightly understood, is quite in unison with that of the other part, of which we have already given an account.

Each of these bands is comprehended at the top between the arms, and at the bottom between the feet, of the same kind of large figure; of which there are two, face to face, (each exactly the same as the other,) one embracing the right band in the manner described, the other the left. And from the mouth of each of these figures one wing of the winged solar disk appears to be issuing, at right angles to the band beneath: and at the bottom of the band on the right, at the bend of the knee, is the head of Isis, and opposite to it, at the bottom of the other band, is the symbol of the crab or of the beetle. There is a figure of a crab or of a beetle also, only smaller, at the bottom of the right band, between the head of Isis and the leg. No doubt both these were meant of the sign of Cancer, which occupies this part of the band in each instance. And as the head of Isis stands here so very distinctly in connection with the sign of Cancer; we may presume that the two heads, one opposite to the other, at the top of each band, are meant of Isis also, in connection with the sign of Capricorn. And the analysis of the representation shews that, as Cancer is actually the sign at the bottom of both bands, so Capricorn is actually that at the top of both.

It is observable that what appears to have been intended for the neck and shoulder of each of the figures, facing one another, or for some of the ornaments of the head-dress reaching from the upper part of the neck to the shoulder, is decorated alike with two rows of beads, each of which was no doubt meant to contain the same number. There are 19 of

these beads on the left hand figure, and 18 on that on the right: consequently probably one too many in the former. Each of these beads being an oval, it may have the power of denoting ten; on which principle the 18 in each instance would stand for 180, and both together for 360: and therefore both together might be intended of the number of degrees in the ecliptic, divided out among the twelve signs.

As both the zodiac of the portico and that of the cieling are part of the sculptures and ornaments of the same building, the one must be as old as the other. If the date of the zodiac of the cieling (a sculpture found on the cieling of a small chamber upon the roof of the temple) is B. C. 798, there would be every reason beforehand to presume that the date of the zodiac of the portico must be B. C. 798 also. If the former has a certain relation to the Apis ritual and to the Apis calendar, that is good ground for anticipating that the latter will be found to have some such relation also. If a zodiac of a certain kind has been discovered on the former, we may expect to meet with a similar representation on the latter.

This latter expectation, it is easy to see, is actually confirmed by the matter of fact. We have nothing to do but to take each of the zodiacal figures, which we have met with in the planisphere of the cieling, and in the order in which we have met with them, and to compare them with what we find in this sculpture of the portico; and we shall perceive that they all occur in this too, and in every instance the same as before, or with very little difference. The Ram is easily distinguished in this zodiac of the portico, in the middle of the right hand band, particularly by the profusion of stars grouped together about it in greater numbers than anywhere else; only here it is not couchant as in the former instance, but salient; standing at least on its hind legs, as if in the act of springing forward. Yet here too it has its head turned *in antecedentia,* in the contrary direction to its own motion. Next to the Ram, in the same forward direction, comes the Bull; and so on, with the rest all round the sphere and through each of the bands, as we shall see by and by.

Each of these bands however consists of two divisions; an upper and a lower: separated by a narrow margin, in which

there is nothing discoverable but characters of various kinds, which appear to be purely hieroglyphical. The upper division contains the signs, and the zodia or animal representatives of the signs, and the stars among and about them. The lower is full of figures also, about which there are also stars to be seen; but not in such numbers as in the upper division. It is observable however that each of these figures below the signs is sitting or standing in a boat. Motion in boats, as we have already mentioned, the motion of sailing or floating, was that which the Egyptians attributed to Divinity as such. *Αἰγυπτίων οἱ μὲν ἐπὶ πλοίου οἱ δὲ ἐπὶ κροκοδείλου τὸν ἥλιον δεικνύουσι. σημαίνουσι δὲ ὅτι ὁ ἥλιος δι' ἀέρος γλυκεροῦ καὶ ὑγροῦ τὴν πορείαν ποιούμενος γεννᾷ τὸν χρόνον, ὃν αἰνίσσεται ὁ κροκόδειλος διά τινα ἄλλην ἱερατικὴν ἱστορίαν*[y]—*Ἥλιον δὲ καὶ Σελήνην οὐχ ἅρμασιν ἀλλὰ πλοίοις ὀχήμασι χρωμένους περιπλεῖν ἀεί*[z]—*Νύμφας δὲ Ναΐδας λέγομεν καὶ τὰς τῶν ὑδάτων προεστώσας δυνάμεις ἰδίως, ἔλεγον δὲ καὶ τὰς εἰς γένεσιν κατιούσας ψυχὰς κοινῶς ἁπάσας· ἡγοῦντο γὰρ προσιζάνειν τῷ ὕδατι τὰς ψυχὰς θεοπνόῳ ὄντι ὥς φησιν ὁ Νουμήνιος· διὰ τοῦτο λέγων καὶ τὸν προφήτην εἰρηκέναι ἐμφέρεσθαι ἐπάνω τοῦ ὕδατος θεοῦ πνεῦμα· τούς τε Αἰγυπτίους* (lege *τοῖς τε Αἰγυπτίοις*) *διὰ τοῦτο τοὺς δαίμονας ἅπαντας οὐχ ἑστάναι ἐπὶ στερεοῦ ἀλλὰ πάντας ἐπὶ πλοίου, καὶ τὸν ἥλιον καὶ ἁπλῶς πάντας· οὕς τινας εἰδέναι χρὴ τὰς ψυχὰς ἐπιποτωμένας τῷ ὑγρῷ, τὰς εἰς γένεσιν κατιούσας*[a].

The figures then, which stand or sit in these boats of the lower division of each band, are no doubt *δαίμονες* of some kind: but to determine of what kind, it is to be observed that there is the same number of boats, each containing one figure, in each division, viz. 19; 38 in all. It is manifest however that, from the peculiar division of the zodiac itself, two of these boats were liable to be repeated, or carried over from the end of one band to the beginning of the other. And this turns out to be actually the case; the second boat of Cancer being carried over from the right band to the left in one instance, and the second boat of Capricorn from the left to the right in the other. To get the true number of actually distinct boats, we must subtract two from 38; and that

[y] Clemens Alex. Strom. v. vii. § 42. p. 31. l. 16. Cf. Porphyry, apud Eusebium, Præp. Evang. iii. 1. §. 48. 249.

[z] Plutarch, De Iside et Osiride, xxxiv.

[a] Porph. De Nympharum Antro, x.

leaves just 36. And this being the exact number of the decani of the different signs of the ecliptic, of which we have already given an account[b]; it is an obvious conjecture that these 36 boats, with the figures which occupy them, must have been intended to represent the 36 decani of the sphere: every three of them consequently the decani of a different sign, each having the charge of ten degrees of that sign, and of the ten and sometimes the eleven days corresponding to them in the calendar of Mazzaroth. And indeed it is affirmed[c] that Champollion, long before the study of hieroglyphics attained to its present degree of perfection, was able to read their names in the hieroglyphical characters which accompany them; and found them to be actually those of the decani in Firmicus, or those which we have exhibited supra[d] in their proper Egyptian style. This point therefore may be considered to have been fully established.

SECTION XIII. — *On the chronological notices discoverable upon the zodiac of the portico, connecting its date with* B. C. 798.

i. B. C. 798, the mean vernal equinox for the meridian of our tables was falling March 31, 15h. 41m. 2s. 24th.: and it would be falling only 10m. 20s. earlier for the meridian of Denderah, which is 2h. 1m. 5s. east of Paris[e], as that of Jerusalem is 2h. 11m. 25s. The relation of the tropical sphere to the sphere of Mazzaroth at this time was such that the cardinal points of the former were falling on the eighth degrees of the latter: and hence the first intimation of the date of this zodiac of the portico; in which the tropical points are thus laid down in relation to the sphere of Mazzaroth.

For every sign, as we have explained, has three boats attached to it underneath. The first of these boats of the sign Aries is No. 1, under that sign; in the middle of which is a figure sitting on a lotus. The date of this boat in the sphere of Mazzaroth B. C. 798 would be March 24–April 3; and this figure is so placed as to stand in the centre of the boat; consequently as nearly as possible half way between the Maz-

[b] Vol. iii. 483. Diss. xv. ch. viii. sect. vii.
[c] Wiseman, Lect. viii. 105.
[d] Vol. iii. p. 488.
[e] Connaissance des Temps.

zaroth date of the vernal equinox, March 24, and the tropical, March 31. We have seen that the symbol of the lotus was capable of characterising a renovation or reviviscence of any kind; and therefore it may stand here as the type of the opening of the year at the vernal equinox. The zodion of the Ram in the upper division is so situated, relatively to these three boats of its proper sign, that its forelegs are in a line with the middle of the second boat, and its hind leg in a line with the prow of the first boat; but it is making its spring from this boat, and its proper motion must be supposed to begin from that. And each boat being divided into ten equal spaces or *μοῖραι*, that is degrees, it will be found, on the nicest calculation which can be instituted, that the hind leg of the Ram is thus springing from the end of the seventh, or beginning of the eighth, degree of the boat beneath; being the first of the boats of Aries, the proper date of which in the calendar of Mazzaroth would be March 24, and the eighth *μοῖρα* or eighth degree of such a boat would be March 31. There cannot consequently be a more significant intimation that the representation which follows is adapted to the sphere of B. C. 848, when the cardinal points were first laid down *in octavis partibus;* and therefore to the sphere of B. C. 798 also: which as yet did not and could not differ in that respect from the sphere of B. C. 848.

ii. In the middle of the second boat of Aries (No. 2.) there is another figure, also sitting on a lotus; but this figure is crowned with the lunar disk, which the preceding figure wants: and the lunar disk was the type of the full moon. The date of this boat in the calendar of Mazzaroth[f] would be April 3; and we have only to turn to the Apis calendar supra[g] for this very year, B. C. 798, to see that by that April 3 was actually the date of the full moon, the full moon of Thoth, the first month itself. We may examine all the boats, and each of the decani belonging to them, with their respective insignia, all round the signs, and we shall find none of them bearing the lunar disk in any other instance; though we may meet with many which exhibit the solar disk: the true explanation of which fact may be that this is the only instance of any such phenomenon as that

[f] Vol. iii. 492–494. [g] See p. 301.

which we have just pointed out, the coincidence of the full of the moon with the first day of one of the decads of the signs.

iii. It is observable also that the zodion of the Bull, which comes next to that of the Ram, has the lunar disk too between its horns; or rather upon its shoulders: and this is so situated relatively to the boats beneath, as to be in a line with the right foot of the Bull, which is almost in a line with the stern of the second boat of Taurus. The date of this boat, in the calendar of Mazzaroth, would be May 4; the date of the last day or last degree of the first boat would be May 3. The lunar disk on the Bull stands over the last degree of this boat, rather than over the first of the next; and May 3 also was the date of the full moon by the Apis calendar, B. C. 798, the full moon of Phaophi. In this instance then the full moon fell on the last day of the decad, as in the one before it fell on the first; and this full moon was the next in order to the preceding, only 30 days after it: which accounts for the recurrence of such a phenomenon so soon afterwards. Yet we observe that this coincidence did not cause the lunar disk, or insigne of the full moon, to be given to the decan in the boat beneath, but to the Bull itself above: and that was a distinction very likely to be made in the second instance of the kind, from the connection of the Bull with the Apis cycle.

iv. If this representation of the portico was purposely so adapted as to begin at the vernal equinox, B. C. 798, in the middle of the right hand band, it is only reasonable to suppose that the upper part of this band, to the right of the Ram, must belong to B. C. 798 also: especially that part of it which is immediately contiguous to the Ram, and contains the sign of Pisces in the upper division of the band, and the three boats of Pisces in the lower one. Now we have only to look at this part of the representation, to recognise the very same figure over the second boat of Pisces, which was among the first of which we had occasion to give an account, in describing and explaining the zodiac of the cieling; the priest inclosed in a circular disk, holding a pig by the foot. We have discovered that the proper meaning of these symbols was to denote the full of the moon; and it is only reason-

able to suppose that that must be their meaning here. The Mazzaroth date of the second boat of Ichthyon, B. C. 798, would be March 4: and if we turn to the Apis calendar of the last year of cycle vii, B. C. 799–798 also [g], we shall find that March 4, B. C. 798, was actually the date of the last full moon in that year of the cycle; the full moon of Mesore, Mesore 30, æra cyc. 3208: that is, almost on the very last day of the cycle itself; half a lunation only before the close of the viith cycle, and the commencement of the viiith. And it is another singular coincidence that the decan of the boat below, immediately under this symbol of the last full moon of the cycle, has four heads, each of them that of the Apis; so as to resemble exactly the four-headed bust, which marked the beginning and the end of the representation on the exterior of the zodiac of the cieling. It is far from improbable that the four heads of this second decan of Pisces might be intended to denote something of the same kind here; and something which had a special reference to the Apis: such as the termination of one cycle and the beginning of another, within the limits of the same lunar month, Mesore 16 to Thoth 11, and in the same sign of the sphere, Feb. 21 to March 24, B. C. 798.

The occurrence of this symbol of the full moon, and of the sacrifice of a pig, at so remarkable a period of the cycle itself as the last full moon of the cycle, the full moon of Mesore, only 16 days before the end of the cycle, may very probably authorize us to conjecture that this was the stated date of such a sacrifice in the last nine months of the cycle; that its stated date in every other year of the cycle was the full moon of Mecheir, as we appear to have already ascertained [h], but in the last year, (which was an imperfect one, consisting of nine months only,) it was the full moon of Mesore. And the reason of this exception to the rule in the case of the last year of the cycle might be that, as the conception of the Apis itself took place at the full moon of Tybi after the beginning of this year, it might not appear consistent to offer the stated sacrifice of the pig at the full moon of Mecheir, so soon afterwards: and if it was not to be offered at the full moon of Mecheir, the first full moon after the conception, no

[g] Supra, 301. [h] Supra, 320.

time might appear so proper for it as the full moon of Mesore, the nearest full moon to the birth within the limits of these nine months. On this principle, the stated date of the full moon of the conception in the last year of the cycle being Mecheir 4, and that of this last sacrifice of the pig at the full moon being Mesore 30; the stated length of time between them would be seven calendar months, or 206 days.

v. If we count the number of stars, which are to be discovered in the upper division of the right hand band, beginning with the sign of the Ram, and taking them in the order of the signs, omitting only one or two which do not appear to have been designed to enter into any such continuous reckoning of days by means of stars; we find it stand as follows:

		Number of stars.			B. C. 798.			
i.	Under the Ram	6	= 6	March	10	Thoth	1.
ii.	Over the Ram	39	= 45	—	16	—	7
iii.	Over the tail of the Bull	4	= 49	April	24	Phaophi	16.
iv.	Over the head of the next figure	4	= 53	—	28	—	20.
v.	Between that and the next figure	4	= 57	May	2	—	24.
vi.	Between the two next	7	= 64	—	6	—	28.
vii.	Between the two next	4	= 68	—	13	Athyr	5.
viii.	Between the two next	6	= 74	—	17	—	9.
ix.	Under the hands of Gemini	5	= 79	—	23	—	15.
	To the end of the Isia, Athyr 20.						
x.	Over the hands of Gemini	7	= 86	—	28	—	20.
xi.	Between Gemini and the next figure	7	= 93	June	4	—	27.
xii.	Between this and the next	4	= 97	—	11	Chœac	4.
xiii.	Between this and the hawk on the phial	6	= 103	—	15	—	8.
xiv.	Over the animal in the boat	6	= 109	—	21	—	14.
				June	27	Chœac	20.

Seven stars, it is true, have been left out of the above account, because they appear to be isolated, and confined to the figures over which they stand. Now no one can fail to be struck with the disparity between the right hand band and the left hand one in this respect in general, that there are scarcely any stars discoverable in the latter, though there are so many in the former; nor also with the difference in the same respect between that part of this right hand band which lies below the Ram in the order of the signs, and that which lies above it in the contrary order. We must suppose

that there was some particular reason for that distinction even in the parts of one and the same half of the zodiac. Now the date, to which the above reckoning of stars as equivalent to days, setting out from the first as supposed to be meant of Thoth 1, æra cyc. 3209, March 10, B. C. 798, has brought us, is remarkable. It is a date with which we are already familiar, as that of the first principal division of the interval between the birth of the Apis and the natales, at the beginning of every fresh cycle; such as B. C. 798, æra cyc. 3209, undoubtedly was: viz. Chœac 20. And we find it terminating too in the first boat of Cancer or Karkinon, the stated date of which was the solstitial day in the calendar of Mazzaroth, June 24: and in the upper division, corresponding to this, we find the figure of an animal, (which is either a cow or a bull, and may be assumed to be the latter as much as the former, its back being turned to the spectator,) reclining in a boat also. It appears to us the most probable explanation of these coincidences, that the reckoning of stars in question was purposely made to continue without interruption from Thoth 1, the first day of the first solar month of the new cycle, down to Chœac 20; and was purposely made to terminate there: in order that it might take in this first integral division of the new cycle, though it did not propose to take in more; that being to be done, or having been already done, by the zodiac of the cieling within the temple. The bull in the boat may be there simply as divine; or in order to connect this day, Chœac 20, with that fact to which it was in reality preliminary, the transport of the Apis, at the proper time, from Nilopolis in the *θαλαμηγὸς ναῦς* down the Nile to Memphis.

It is observable that the decan of the boat below this bull has the hawk's head of Horus, and a large solar disk, resting on an uræus, with which it is surmounted. These insignia point out a decan of no ordinary rank; and he is the decan of the first boat of Cancer, and of the summer solstice of Mazzaroth, June 24.

It is observable also that in this part of the upper division, next to the bull in the boat, are two figures, which appear to be meant for Osiris and Isis. They are standing in a boat; and Isis is pouring out water from a phial in each

hand. The Mazzaroth date of the boat below, the second of Cancer or Karkinon, would be July 5–15. The true summer solstice B. C. 798, as we have seen, bore date July 2. The Nile consequently must necessarily begin to rise in this boat; and that might be implied by the two phials, and by the water streaming from them; the efficient agents of the inundation itself notwithstanding being Osiris and Isis, both concerned in this act of pouring out the water.

vi. It has been already observed that the second boat of Karkinon is carried over from the bottom of the band on the right to the bottom of that on the left. The first boat then in the left band, as we ascend from the bottom to the top in the order of the signs from Cancer to Capricorn, is the second of Karkinon. The next to that is the third: the date of which in the sphere of Mazzaroth would be July 15 to July 25. The zodion of the Lion stands over the whole of this boat; as if it claimed it as much as the zodion of the Crab: and the last degree or last day of this boat, July 24, might be said to be common to both. But the true reason of this advance of the Lion, contrary to the order of the signs, from its own limits into those of Cancer, probably is the connection of this decad of Karkinon with the inundation, now actively going on in it, and the connection of the Lion with the inundation. The most observable circumstance however is that the left paw of the Lion is in advance of the right, and the right is about three *μοῖραι* or three degrees from the beginning of the boat; which reduced to days would be equivalent to three days, July 15—17; and in a line immediately under this right paw, yet not in the upper division containing the zodiac, nor in the lower containing the boats, but in the space between, appropriated to the hieroglyphical characters and legends, and therefore occupying a singular position for stars, of which there is no similar instance discoverable besides, there are three large stars: which being read upwards as days would correspond to July 15, 16, and 17: the last of them consequently the date of the heliacal rising of Sirius, for the latitude of Denderah, just as July 22 was so for that of Heliopolis, B. C. 798. We think this the most probable explanation of the peculiar position of these three stars. In the zodiac of the

cieling indeed we have discovered the representative of the heliacal rising in a star which answered to July 22. But there can be no doubt that for the latitude of Denderah in 24° N. July 17 would be as properly the date of that phenomenon as July 22 for the latitude of 30° N. And it might be considered right to notice this date in the zodiac of the portico in the peculiar manner just described, as much as the other, (which was the proper epoch of the Sothiacal period,) in the zodiac of the cieling. The two first boats of Leonton, July 25—August 14 are lost out of the representation at present. We cannot therefore say whether any notice was taken in them of the date of the genitura mundi, August 8.

vii. And lastly it is a curious coincidence that in the whole of the upper range of the right band no stars are discoverable which appear to have a proper chronological character, and to be intended of a reckoning of days by means of stars, except below the zodion of the Ram on the left, and above it on the right; those on the left being far the most numerous, and those on the right being no more apparently than five in number, two of which stand over the first boat of Aries, and three over the third boat of Pisces. There are two figures indeed on the right of the Ram, each of which has a star on its head; neither of which do we take into account, because it appears to us to have a special reference to the figure over which it stands. Now we have ascertained two facts; one that the reckoning of the stars from the Ram forwards to the left begins on the first of Thoth; the other that the representation over the second boat of Pisces (the priest and the pig in the circle) belongs to the 30 Mesore: what then can be the meaning of the five stars, over the two next boats, between Mesore 30 and Thoth 1, but the five epagomenæ? placed here, in all probability, if for no other purpose, yet in order to point out the end of the year, and that the reckoning of the stars, from the sign of the Ram forwards, next in order, in and about which they are so thickly clustered, was to begin from Thoth 1: as in fact we have seen that it does.

Section XIV.—*On the representation of the zodion of Cancer, and of that of Capricorn, on the zodiac of the Portico.*

The remarkable number of stars, (not less that 45,) grouped all together in this zodiac in and about the sign of the Ram, is a very plain and intelligible intimation that this was the principal and leading sign; and that, whatsoever the actual division and actual representation of the zodiac itself might be, the reckoning of the signs and of the zodia was to be understood to begin with this. It must therefore be a mistake to begin this reckoning either from Cancer, at the bottom of one band, or from Capricorn, at the top of the other. The only proper beginning is from Aries in the middle of the right-hand band.

As to the manner in which the zodions of the different signs are represented here, in comparison with those of the zodiac of the cieling; the eye is most competent to detect both the agreement and the disagreement which exists between them: and to that mode of judging of them, both for clearness and for brevity's sake, we refer our readers. The most important zodia are those of Gemini and Aquarius: and in neither of these is there any difference discoverable between the zodiac of the porch and that of the cieling. The zodion of Virgo here too has the ear of corn in its hand. The representative of the seventh sign here too is the scales: and it is very observable that here also, in the middle of the fulcrum or beam of these scales, in a circle underneath, we see exactly the same figure, in a sitting posture, which we saw under the same circumstances in the zodiac of the cieling: the date of which was there reducible to the Mazzaroth date of the autumnal equinox, Sept. 23, coincident also B. C. 798 with the middle day of the natales Apidis.

It is observable likewise that the figure next to the scales, and standing over the second boat of Libra, is a large circle, in which there is a figure holding the koukoufa sceptre; and on which there is a symbolical hawk: each capable of implying that it was sacred in some manner or other to the sun. The date of this boat would be October 3, the second day after the autumnal equinox, B. C. 798, October 1 at 18 hours, and three days later than the Mazzaroth date of the

equinox, September 30*. Plutarch speaks of an Egyptian ceremony, which he calls *βακτηρίας ἡλίου γενέθλιον*, the date of which was after the autumnal equinox, not before it[i]; and which he himself specifies in the Greek style of the lunar calendar, on the *ὀγδόῃ φθίνοντος* of Phaophi, which means the 23d of the lunar month. Macrobius also appears to have intended this particular ceremony, in the account which he gives of certain modes of representing the sun, among the Egyptians, at each of the four cardinal points of the year[k]; the fourth being that of an old man, or of a man growing old and losing his strength, and consequently requiring support *ab extra*, such as by means of a staff. It is far from improbable that the figure within the circle in this instance is meant of the sun in that capacity; as beginning to wane and lose its power from the time of the autumnal equinox forwards to the winter solstice: and that this representation standing over the middle boat of Libra or Zygon has something to do with the birth-day of the staff of the sun in that decad itself. The figure in the circle above seems to have been purposely placed over the 3d or 4th degree of the boat below; i. e. over October 6: and October 6, it should be remembered, was the Isiac date of the autumnal equinox, B. C. 1350, in the same year of the cycle of leap-year in the Sothiacal period as B. C. 798. And there is reason to believe, as we may possibly be able to shew some time or other, that the actual date of the birth-day of the staff of the sun, originally, was October 6.

The principal differences however, discoverable between the zodiac of the porch and that of the cieling, affect two signs only, the sign of Cancer and the sign of Capricorn: that is, the two solstitial signs. The zodion of Cancer, in the zodiac of the cieling, is undoubtedly the crab: in this of the porch—

			h.	m.	s.
* Mean V. E. at Heliopolis, B. C. 798	March	31	15	25	18·4
Two quarters	..	182	14	54	25·2
Mean A. E.	Sept.	30	6	19	43·6
Equation of the centre		+ 1	12	35	45·3
True A. E.	Oct.	1	18	55	28·9

i De Iside et Osiride, lii.

k Saturnalia, i. xviii. 300. Cf. Epiphanius, Operum i. 1092, 1093. Expositio Fidei Catholicæ, xi.

to judge from its size and its shape, and from its having only six legs, instead of eight—it must be a scarabæus. It would make no difference to the place and order of the sign intended to be represented by it, whether it was a crab or a scarabæus; for the scarabæus also, as we were told by Clemens Alexandrinus[l], was the type of the lower hemisphere: and therefore might be so of the summer solstice, or of the transition of the sun from the superior to the inferior hemisphere, which takes place at the summer solstice. From the occurrence of the beetle then in this sign of the zodiac of the porch, at the bottom of both the bands alike, we may reasonably conclude that the Egyptians must once have thought of representing that sign by the scarabæus; or that they considered the scarabæus proper for it as much as the crab.

The zodion of Capricorn, in the zodiac of the cieling, as we have seen, was a figure half a goat and half a fish: and such a figure occurs in the zodiac of the porch, the same in all respects, or nearly so; but over the second boat of Capricorn, the last boat in the band on the left. The representative of the first boat of Capricorn in the upper division of this band, consequently in the proper place of the zodion of the sign itself, is a figure which has the head and horns of a bull rather than those of a goat, but is totally without fore feet, and has only one hind foot, on which it appears to be rising up, as if in the act of springing forward; while a figure stands opposite to it, with the hawk-head of Horus, and with a dart in his two hands; which he is lifting up and pointing towards the forehead of the animal in front of him, as if about to pierce it, or at least to arrest its progress, and to drive it back. The animal which fronts this figure has altogether a Typhonian appearance; but the figure which is opposing it, and about to strike it with the dart, cannot be mistaken, it must be that of Horus. It is manifest therefore that such a representation, though found in the sign of Capricorn, would have been altogether appropriate to the contest of Typhon and Horus, which, according to the fable explained by us in illustration of the zodion of Aquarius[m], was supposed to have begun in Aquarius.

It is true, that this figure of Horus stands here partly in the second and partly in the third boat of Sagittarius; and

l Vol. ii. 487. Diss. xiii. ch. ii. sect. iv. m Vol. iii. 396. Diss. xv. ch. vi. sect. xii.

that of this Typhonian animal almost wholly over the third boat of Sagittarius: but its hoof is strictly over the first degree of the first boat of Capricorn, the date of which in the sphere of Mazzaroth was that of the winter solstice itself, Dec. 23. There are five stars discoverable about this Typhonian figure; each of which appears to be meant of a day: and each being reckoned as a day, but from the hoof of this animal upwards, as the necessity of the case seems to require they should be, they would bring us from December 23 to December 28; which on this principle would be the date of the termination of the contest of Typhon and Horus.

Now we saw reason to conclude, from the testimony of the lunar mansions[n], that this contest was considered to have occupied in some sense or other the space of three lunar mansions complete. If then we reckon back 39 days, or three mansions, from Feb. 5, (the stated date of the termination of this contest in the 15° of Hydron in the sphere of Mazzaroth,) we come to December 28. To judge from the names of the mansions, the contest must once have been supposed to have begun in the xxii mansion of type iii of the epoch of B. C. 848, the xxi of type i and type ii; the actual date of which, B. C. 1347, at the epoch of type ii, was December 28. We have no better explanation to propose of these figures. Our readers must judge for themselves of its probability. But it must necessarily, we think, be inferred from them, that the mode of representing Capricorn which first occurred to the Egyptians was different from that which they ultimately adopted; and was taken from the idea of a contest between the sun in the person of Horus, as the type of the fostering principle of vegetable life, and Typhon, in the person of a wild and furious bull, as the antagonist principle of vegetable destruction; a contest beginning at the solstice of Mazzaroth, when the sun began to recover his power, and lasting five days or more, to the time when his power and influence were first sensibly recovered and renewed.

It is however a singular circumstance that the same hippopotamic figure, of which we have already given an account in illustration of the zodiac of the cieling[o], is twice met with also in this zodiac of the portico; first in the sign of Scorpio, and again in this of Capricorn: which virtually implies its

[n] Vol. iii. 400. 596. [o] Supra, note at p. 331.

presence and influence in the sign of Sagittarius likewise between the two. It appears first over the first boat of Scorpio, and over the very first degree of that boat; which would answer to October 23, just 30 days later than the autumnal equinox in the calendar of Mazzaroth, Sept. 23. It stands there immediately before the zodion of Scorpion, and it has the tail of the scorpion itself; which shews that it partakes of its nature, particularly of its power to destroy; and consequently that its character here is that of a principle inimical and injurious to life: and it must be self-evident that at the beginning of the first decad of Scorpion, Oct. 23, as the sowing of seed must have been going on every where on a general scale, so the destruction of the seed in the way of vegetable corruption, even as preliminary to vegetable reproduction, must have been going on equally generally. It appears again over the middle of the first boat of Capricorn; and in this instance with no such tail as in the former: but it stands behind the Typhonian figure contending with Horus; and that has a tail, resembling the tail of the scorpion, and composed of nine nodi or joints: of which tail this figure has hold, in such a manner as to cut off six knots from the rest by the act of grasping it.

Now this figure being the type of Thuoëris, the mistress of Typhon, who nevertheless abandoned him at last to take part with his antagonist Horus, in the contest which ended in his death; we have seen reason to collect from that fable, that though she must have been regarded as allied at first to the principle of death and destruction, typified by Typhon, she must have been regarded also as of a nature akin to that of Isis, Osiris, and Horus themselves at last: and particularly to that of Isis; the great parent of life of all kinds. And this Thuoëris herself, as we have seen, was always represented as pregnant with the seeds of life, especially of vegetable life, which must some time come into actual existence under the fostering influence of Horus, the sun. It is easy to see that, on the principles of the fable itself, this mixed principle, partly destructive partly vivificative and productive, represented by Thuoëris, after acting in concert with Typhon for a time, must forsake him at last, and take part with Horus against him. The only question would be,

when? And this, it appears to us, is answered by the figure which stands behind the Typhonian Bull in the sign of Capricorn, and seems to be holding him back in one direction, while Horus with the dart in front is opposing his progress in the other. She is represented as cutting off six nodes of the tail of this bull, borrowed from the Scorpion: reckoned however from the joint of the hoof, which stands right over the solstitial date of Mazzaroth, Dec. 23, in the boat below: and this would be competent to imply that for six days, reckoned from the solstitial date Dec. 23, Typhon should retain and exert his power to destroy; but that on or after the sixth day, December 28 or 29, it should cease and determine altogether. This would be wonderfully in accordance with the conclusion already obtained from the five stars about this Typhonian bull — that the contest between him and Horus, beginning Dec. 23, lasted five days, but no longer; that is, was decided on Dec. 28.

The probable explanation of all this is the fact that seeds sown even at the winter solstice would germinate in Egypt in six or seven days: and therefore the contest between vegetable death and vegetable life beginning on the solstitial day, Dec. 23 itself, might be said to last 6 days; but no longer. On the seventh the principle of life, elicited, strengthened, and confirmed by the genial power of the air and the sun of that climate, would appear to predominate; and the contest between the two tendencies must be at an end: and therefore the contest between Horus and Typhon for that year at least must cease. Such appears to have been the idea of this process which sometime or other suggested itself to the minds of the Egyptians; and though they do not seem to have adopted it ultimately, yet it is attested by this representation of the zodion of Capricorn, in the zodiac of the portico, so different from that on the cieling, and by the names of the mansions, in the type of B. C. 848, in the same quarter of the year.

The infant Harpocrates, the posthumous son of Osiris according to the fable, was the type of this principle of vegetable life, developing itself and coming into existence according to its natural tendency even under the most unfavourable circumstances; that is, at the middle of winter itself:

and though feeble, infirm, and tottering, as Harpocrates himself was represented to be, yet still living from the first, and every day liable to acquire fresh strength. It was natural therefore to represent him as born *περὶ τροπὰς χειμερινὰς, ἀτελῆ καὶ νεαρὸν, ἐν τοῖς προανθοῦσι καὶ προβλαστάνουσι*[q], among the first and earliest productions of that season. It was a mistake of Macrobius to confound him with the sun of the winter solstice[r], i. e. with the sun in its feeblest state; as he appears to have done. Plutarch however tells us it was usual to carry the Apis (for he no doubt means that bull here under the name of *The* Bull) seven times round his *ναὸς* or temple, *ὑπὸ τροπὰς χειμερινὰς*; a ceremony which they called the *ζήτησις Ὀσίριδος*[s], and which he explains as if these seven circuits of the temple by the Apis were intended of the seven months which must intervene between the winter solstice and the summer solstice, before the Nile could begin to rise afresh. But the name of the ceremony, the *ζήτησις Ὀσίριδος*, (who was never sought for except as the seed, buried in the ground and lost from view, and never found again except as the plant, springing up out of the seed at last,) and the number of circuits with the Apis, which might be purposely intended to be symbolical of seven cycles of day and night, and the fact to which we have just adverted, that seed sown in Egypt at the winter solstice would vegetate in seven days' time, in our opinion very clearly imply it to have been intended of nothing but the first seven days from the solstice of Mazzaroth, Dec. 23 to Dec. 29*. This ceremony therefore would be quite in character with the supposed duration of the contest of Typhon and Horus, as beginning at the winter solstice, Dec. 23, and lasting six

* Dec. 29 B.C. 798 was the date of the true winter solstice. The fourth quarter entered December 29 8 h. 56 m. 15 s·4.

			h.	m.	s.
Mean V.E. at Heliopolis, B.C. 798 ..	March	31	15	25	18·4
Three quarters		273	22	21	37·8
Mean winter solstice	December	30	13	46	56·2
Equation of the centre	—	1	4	50	40·8
True winter solstice	December	29	8	56	15·4

q Plutarch, De Iside et Osiride, lxv: cf. lxviii.
r Saturnalia, i. xviii. 300. See supra, p. 356.
s lii.

days, to December 28 inclusive, but as decided and over on the 29th; that is, strictly speaking *on* the seventh day, when the seed sown upon Dec. 23 would first appear to have germinated and come to life in the shape of the plant.

It is observable also of this zodiac of the portico, that something analogous to the tail of the scorpion is represented upon it as issuing even from the tail of the hippocentaur, and ascending in a kind of curve from the root of the tail upwards: at the other end of which too appears to be the figure of an hawk, the bird of the sun. Sagittarius is necessarily included between Scorpio and Capricorn; and if the power of Typhon had already begun to be exerted in Scorpio, and was first made to cease only in Capricorn, it must be still active in Sagittarius. Hence probably the appendage of the scorpion's tail to that sign also. The hawk however, over the same zodion, towards which the face of the archer is directed, and the wing in front of it, which is commonly an appendage of the solar disk, appear to designate this sign in another capacity; viz. that of the sign in which the motion of the sun was most rapid: and therefore in that sense peculiarly his own.

Section XV.—*On the Boats and on the Decani of the signs in the zodiac of the Portico.*

Besides the figures in the upper division of each band which represent the signs of the zodiac, many others are discoverable there which are certainly extra-zodiacal; though what they must have been actually intended for, it may be difficult to say. We conjecture however that in this instance, as in the similar instance of the figures in attendance on the zodia of the cieling, they are the decani of the different signs in some sense or other; distinct from the zodiacal figures in the upper division, and from the figures below too, which are properly to be called decani: though in what their distinction from these latter consisted we are not prepared to say. But there was a tropical sphere, in every form of the sphere, as well as one of Mazzaroth; and the decani below in each instance are the decani of the sphere of Mazzaroth: these above may be those of the tropical sphere. Or they may be the first

and proper expression of the Egyptian scheme of decani, before they substituted for their own that of the Chaldæans.

With regard to the figures and to the boats below; it is not our intention to dwell particularly upon them. We have already explained how it has happened that there are 38 boats and 38 decani apparently, while there should be only 36. The second boat and second decan of Karkinon occur at the bottom in each band; the second of Ægon comes in twice at the top. Stars are discoverable in these lower divisions too, probably intended for days: but as we were told by Firmicus that, though every decan had nominally ten degrees of the sign under his jurisdiction, yet these were always distinguishable into full and empty; we shall not be surprised to find the same peculiarity pervading these stars in each case below: so that there is not the same number in each. In one only (the second boat of Taurus,) there are ten stars to be seen at once, and in one more, (the third of Taurus,) as many as fifteen. But it would not be possible to reduce the scheme of decani here exhibited to that of Firmicus: nor shall we attempt to do it. Neither do we consider it worth our while to consider the accounts of these different decani which the writers on hieroglyphical subjects may have given. We have dwelt long enough on these topics: and we shall confine ourselves to one point only, which may possibly lead to an interesting discovery.

The decan of the third boat of Scorpion is a cynocephalus, sitting on his haunches in the midst of a large solar disk. The date of that boat would be November 13: and the middle day of the boat, the fifth from the first exclusive, would be November 18 inclusive. This decan has only one star allowed him; and therefore only some one day. We explain this circumstance at once, if this cynocephalus stands here as the representative of Thoth his master, in relation to a solar, not to a lunar, year of some kind. The personal relation of Thoth himself, B. C. 798, and long before that, ever since the institution of the Apis cycle, B. C. 973, must have been restricted to the lunar year: but the Egyptians had various forms of the year; and in particular various forms of the Julian year, to any of which the relation of Thoth might very properly be represented by the cynocephalus, divested of any lunar character, if not by himself; especially by

the cynocephalus enclosed in the solar disk. Now the oldest, and next to the Sothiacal the most sacred and most important, year of that description, which the Egyptians had among them, was the Phœnix type; of the epoch of Nov. 18 and 17, B. C. 1848. We are altogether of opinion that the cynocephalus is introduced here, sitting in the midst of this circle, as the decan of the last boat of Scorpion, in which the beginning of this year, and in the calendar of Mazzaroth, always fell; either on Nov. 17 or Nov. 18, and consequently always on the middle day of the decad itself, the last day of the first half, or the first day of the second half: and that this is the reason why the cynocephalus is thus placed here, and has one day only allowed him; which on this principle, and in this year B. C. 798, must have been intended of Nov. 18*.

* There is possibly a further meaning attached to these symbols, which would be still more curious and interesting could it be assumed to be really intended by them. We have ascertained from one case of the kind, supplied by the zodiac of the cieling, that the circle may stand for a cycle; for the period of an *ἀποκατάστασις*, whether longer or shorter: and consequently for the revolution of the cyclical year round any fixed term; as for example round this fixed Julian term, Nov. 17 or 18, the epoch of the Phœnix type of the Julian year. Now an inscription in Greek has been discovered on the pronaos of this temple of Denderah, which makes us acquainted with the probable date of these sculptures also, considered as facsimiles of much more ancient representations of the same things, which were either then restored to their original state, or then consigned (as copies and exemplars in all respects of those more ancient originals) to the walls or the roof of this temple. This inscription, according to Mons. Le Tronne[t], stands as follows: *Ὑπὲρ αὐτοκράτορος* Τιβερίου Καίσαρος *νέου* Σεβαστοῦ, *θεοῦ* Σεβαστοῦ *υἱοῦ, ἐπὶ* Αὔλου Αὐιλλίου Φλάκκου *ἡγε|μόνος,* Αὔλου Φωλουΐου Κρίσπου *ἐπιστρατήγου,* Σαραπίωνος Τρυχάμβου *στρατη·γοῦντος, οἱ ἀπὸ τῆς μητρο|πόλεως καὶ τοῦ νομοῦ τὸ πρόναον* Ἀφροδίτῃ *θεᾷ μεγίστῃ, καὶ τοῖς συννάοις θεοῖς.* | L. κ̄. Τιβερίου Καίσαρος Ἀθὺρ *κά*. If this was always its tenor, we should thus learn from it that the date of the dedication of the pronaos was the 21st of Athyr, in the 20th year of Tiberius[u].

The reign of Tiberius in the canon of Ptolemy is supposed to begin on the 1st of Thoth Nab. 762, August 20 A. D. 14: but as he really came to

[t] Tom. i. x. P. i. 90.

[u] It would be a singular coincidence that the inscription should thus be dated in this year of Tiberius, and yet in the government of Flaccus Aquillius also. We shewed in our Dissertations, (Diss. xiii. vol. i. 445, 446,) that Flaccus must have had six years, and six years complete; the last of which having expired October 12 or 14 A. D. 38 (see our Prolegomena, cap. iii. 167–170, and cf. supra, vol. ii. 589. Diss. xiii. ch. vi. sect. x.) the first must have begun on or before that day at least A. D. 32.

Again, the Greek name for the Egyptian Anoubis or Anubis in the hieroglyphic is Anepo or Anoup, in the

the throne, in consequence of the death of Augustus, a day earlier even according to the Julian calendar, and two days earlier according to the Roman of the time being; it is manifest that, agreeably to the Alexandrine rule of reckoning the reigns of the emperors, (a rule which has been ascertained and confirmed in various ways,) his reign would bear date from Aug. 29 A. D. 13. And that being assumed as his first year, his 20th year would bear date August 29 A. D. 32. Supposing then the day of the dedication this year to have been actually Athyr 21, and Athyr 21 taken from the Alexandrine calendar, in which the stated date of Athyr, in the second year of the cycle, like A. D. 32, was October 28; it is manifest that Athyr 21 would coincide with Nov. 17: and Nov. 17 A. D. 32, in the first year of the Julian cycle of leap-year, but in the fourth year of the cycle of the Phœnix type, would be the stated date of the Phœnix Julian calendar also.

Now no one would be justified in saying that such a coincidence as this must have been purely accidental; and that it might not be the effect of design and contrivance: particularly when we consider the great importance which the Egyptians attached to cyclical dates, or cycles of restitution. Nothing is more probable than that, if it could be so contrived, the date of the restoration of the temple would be made to coincide with the oldest form of the Julian calendar in Egypt, November 17. The equable Athyr 21, of the same year, was falling Nov. 3, 14 days before this term, Nov. 17; and the first of Thoth, August 15, more than three months earlier. That would suffice to shew that the cyclical Thoth had made one complete revolution round the fixed Julian term, Nov. 17 or 18; but only one: and therefore that when this symbol of the cynocephalus in the circle was consigned to the zodiac, B. C. 798, it could not as yet have made even one; it must still have been making the first. And thus we should account for one cynocephalus, in the midst of that circle, but only one: the cynocephalus being the type of the solar year, attached to this one day, Nov. 17 or 18, and the circle in which it is sitting being the symbol of the cyclical year, revolving about this solar one.

We cannot indeed take these coincidences for granted; because, after all, that part of the inscription on which they depend, (the part at the end, which assigns the date,) has been obliterated in the original, and has been only conjecturally restored by Mons. Le Tronne. But Mons. Le Tronne's great experience in this branch of criticism, his well known sagacity and the happiness of his emendations in other instances, give even his conjectural restoration of the text in the present instance a degree of authority to which it would not otherwise be entitled. The letters which he has thus supplied are no more than necessary to fill up the lacunæ in the original. There cannot be much doubt concerning the year of Tiberius. It must have been one of the last four years of his reign, because it was one of the years of the government of Aquillius Flaccus under him. This date Nov. 17 Athyr 21 in the Alexandrine calendar was not the date of Tibe-

Coptic is Anob, or Anoub[x]; and Anebe being the Coptic term for a dog, as this Anubis, at present, is always found with the head of the Egyptian greyhound or jackal, (in the hieroglyphic, *Ebasi*[x],) it might easily be supposed, as it appears to have been by the Greeks and Romans, that he had properly the form of a dog: though we consider it far from improbable, notwithstanding the mode in which he appears represented on the monuments at present, that he might actually be exhibited among the Egyptians under the form of a dog also.

Now Anubis himself has the appellation of "lord of the heavens," and of "resident in the divine gate[y];" and in the funeral ritual, or book of the dead, he is styled "the good guardian; or opener of the disk of the sun[z]." This serves to explain the presence of such a jackal in both the zodiacs; both in the centre of that of the cieling, and at the vernal equinox, along with the sign of the Ram, not only in that but in the zodiac of the porch also.

The hieroglyphical title of this jackal is *Hophioue*[x]; the meaning of which is "seated in the roads of the sun's path:" and as such it enters the Chevalier Bunsen's list of ideographics in three analogous forms[a]. In this capacity it was represented seated on a door or gate, placed north and south. As Hophioue of the north, it was "guardian of the terrestrial world;" as that of the south, it was "the lord of the heaven[x]:" consequently as the former it had charge of the year either from the winter solstice to the summer solstice, or from the vernal equinox to the autumnal; and as the latter, from the summer solstice to the winter, or from the autumnal equinox to the vernal.

Now there is one of these jackals in the zodiac of the

rius' birthday; the Roman date of which xvi kal. Dec. A. D. 32 agreed with the Julian Nov. 16: though that too, as Mons. Le Tronne conjectures, might have had something to do with the day selected for the date of the dedication. It may be questioned indeed whether the Egyptian date corresponding to the Roman, in a case of this kind, would be taken from the Alexandrine, and not from the equable calendar. The latter is more probable.

[x] Egyptian Ant. P. i. p. 43. 51: cf. Bunsen, B. i. sect. vi. C. ii. 436.

[y] Ibid. 44.

[z] Ibid. 43. note 16.

[a] Chevalier Bunsen, B. i. App. ii. A. p. 515. No. 262, 263, 264: cf. Egypt. Ant. i. 51.

portico, distinct from that which occurs in the sign of Aries; the place of which is over the second boat of Scorpio. It is represented as if mounting a stage or frame, such as is described by the chevalier Bunsen [e]; at the end of which is the Uræus, the symbol of divinity, or of the lower hemisphere; and in front of the jackal itself is the hawk sacred to the sun. And these are sufficiently clear intimations of the hophioue of the south, "the lord of the heaven:" and not of that of the north, "the guardian of the terrestrial world."

We have already had occasion to explain [f] that one of these hophioues had also the name of *Rokh-Naa*, the hophioue of the greater heat; and the other that of *Rokh-Kougi*, the hophioue of the lesser heat: the jurisdiction of the former extending from the vernal equinox to the autumnal, and that of the latter from the autumnal to the vernal. The meaning of this distinction however ultimately was that these two hophioues divided the year between them; and in such a manner that the half of the year, during which the greater heat predominated, belonged to the jurisdiction of the hophioue of the north, and the half, during which the lesser prevailed, to that of the hophioue of the south.

In the representation on the Memnonium, which dated the period of the greater heat from Thoth to Phamenoth, and that of the lesser from Phamenoth to Thoth, the distinction appeared to have been critically adapted to the Julian calendar of Thebes; in which the first of Thoth bore date from the vernal equinox, and the period from Thoth to Phamenoth was strictly that of the greater heat, and the period from Phamenoth to Thoth was strictly that of the lesser. It is manifest however that the principle of such a distinction was applicable to any division of the year, from a certain time after the autumnal equinox to the same time after the vernal. This jackal stands over the second boat of Scorpion; the date of which was Nov. 3–13: and the middle day was Nov. 8. Now B. C. 1848, at the date of the Phœnix type of the Julian calendar, when the autumnal equinox was falling Oct. 7, (in the calendar of Mazzaroth,) and the true equinox on Oct. 9, that would be just about one month later than the autumnal equinox: and no one could say that, for such a

[e] Ideographics, No. 263.

[f] Supra, p. 228.

climate as that of Egypt, the heat would be very sensibly diminished under a month after the autumnal equinox.

It is far from improbable therefore that the position of this jackal here, especially for such an epoch as that of B. C. 798, not strictly at the autumnal equinox, but more than a full month later, was intended to point out the division of the lesser and the greater heat in the original type of the Julian year. And this jackal being placed here, on or about November 8, as the representative of the Rokh-Kougi in that type, it must be hereby implied that the proper place of the jackal of the Rokh-Naa, in the same type, would be 182 days later, on or about May 9: in which month tradition among the Egyptians, as we have already had occasion to shew[g], has always placed the beginning of the most intense heat to which their country is liable; owing to the prevalence of the winds from the south.

CHAPTER II.

On the primitive lunar calendar; and on the derivation of the Apis cycle from a primitive one of the same kind.

SECTION I.—*The existence of this primitive cycle a question of fact.*

HOWEVER probable it may seem *a priori* that the natural lunar cycle of the equable solar year must have been associated with it from the first, and therefore must have been known to mankind, and used by mankind along with this primitive solar year, from the first; yet whether it was actually so associated, so known, and so used, would be after all a question of fact; which must be decided, like all other questions of fact, by testimony, if testimony was to be had for that purpose: or in defect of direct and positive testimony to the fact, by means of other facts, themselves unquestionable, which could not be explained and accounted for without the admission of this. Testimony indeed, express and direct to the truth of such a matter of fact as this, is nowhere discoverable at present; but there are several facts

[g] See vol. ii. 560.

concerning which no doubt can be reasonably entertained, which appear to be ultimately resolvable into this; and therefore to be of a nature, if not directly yet by implication, to attest and substantiate this. Of these facts we shall now proceed to give some account.

SECTION II.—*Of the facts which appear to attest and substantiate it.*

i. It has been seen[h] that the true epoch of lunar time in connection with the present system of things, as supposed to bear date from the first *actual* appearance of the moon, was the luna ultima or penultima, not the luna prima: and that being the case, it cannot be denied that the luna 29[a] must have had a closer, a more direct, and a more proper relation to the absolute beginning of lunar time than the luna prima itself. Nor can it be doubted that a fact like that was capable of being perpetuated by tradition down to the latest times; and especially among the Egyptians: among whom in particular the vestiges of primitive traditions such as these may be discovered in other instances, similarly handed down from the first, and still faithfully and exactly preserved.

Now we actually meet with a traditionary belief among the Egyptians that the 29th luna, for some reason or other, was the *γένεσις κόσμου*, or natale mundi. Thus much at least may be inferred from the following passage of Horapollo, where he is explaining the different meanings attached to the hieroglyphical symbol of the beetle[i]: *Μονογενὲς δὲ δηλοῦντες ἢ γένεσιν ἢ πατέρα ἢ κόσμον ἢ ἄνδρα κάνθαρον ζωγραφοῦσι. μονογενὲς μὲν ὅτι αὐτογενές ἐστι τὸ ζῶον, ὑπὸ θηλείας μὴ κυοφορούμενον. μόνη γὰρ γένεσις αὐτοῦ τοιαύτη ἐστίν.*

Ἐπειδὰν ὁ ἄρσην βούληται παιδοποιήσασθαι βοὸς ἀφόδευμα λαβὼν πλάσσει σφαιροειδὲς, παραπλήσιον τῷ κόσμῳ σχῆμα· ὃ ἐκ τῶν ὀπισθίων μερῶν κυλίσας ἀπὸ ἀνατολῆς εἰς δύσιν αὐτὸς πρὸς ἀνατολὴν βλέπει, ἵνα ἀποδῷ τὸ τοῦ κόσμου σχῆμα· αὐτὸς γὰρ ἀπὸ τοῦ ἀπηλιώτου εἰς λίβα φέρεται, ὁ δὲ τῶν ἀστέρων δρόμος ἀπὸ λιβὸς εἰς ἀπηλιώτην. ταύτην οὖν τὴν σφαῖραν κατορύξας εἰς γῆν κατατίθεται ἐπὶ ἡμέρας εἰκοσιοκτὼ, ἐν ὅσαις καὶ ἡ σελήνη ἡμέραις τὰ δώδεκα ζώδια κυκλεύει· ὑφ' ἣν (sc. *τὴν γῆν*) *ἀπομένον ζωογονεῖται τὸ τῶν κανθάρων γένος. τῇ ἐνάτῃ δὲ καὶ ὀγδόῃ* (corrige *εἰκο-*

h Vol. ii. Diss. ix. ch. i. sect. v and vi.

i i. 10.

στῇ *) ἡμέρᾳ ἀνοίξας τὴν σφαῖραν εἰς ὕδωρ βάλλει· ταύτην γὰρ τὴν ἡμέραν νομίζει σύνοδον εἶναι σελήνης καὶ ἡλίου, ἔτι τε καὶ γένεσιν κόσμου· ἧς ἀνοιγομένης ἐν τῷ ὕδατι ζῶα ἐξέρχεται, τουτέστιν οἱ κάνθαροι.

If the 29 luna of the calendar is to be supposed the date of the conjunction, the calendar luna prima must be reckoned from the phasis, and the calendar phasis must be dated on the luna tertia or quarta: neither of which things could have been the case in Horapollo's time, but the latter in particular, as we shall see by and by, must have been the case from the first. The most important statement however in the preceding passage is that which is next subjoined; viz. that the 29 luna was considered to be the *γένεσις κόσμου*. This opinion is certainly in accordance with the matter of fact; that the first lunar phasis, connected *de facto* with the existing system of things, was the luna 29ª or 30ª: and it appears to us altogether the most reasonable explanation of the opinion itself, that it was nothing but a primitive tradition which had delivered the recollection of that fact, among the Egyptians in particular, down to the latest times †.

* The context requires the 29th day here: and that is correctly assigned in the following of Ælian, De Natura Anim. x. 15; in which we have the same account given, only more briefly: Ὁ κάνθαρος ἄθηλυ ζῶόν ἐστιν, σπείρας δὲ εἰς τὴν σφαῖραν ἣν κυλίει, ὀκτὼ δὲ καὶ εἴκοσιν ἡμερῶν τοῦτο δράσας, καὶ θάλψας αὐτήν· εἶτα μέντοι τῇ ἐπὶ ταύταις (consequently on the 29th) προάγει τὸν νεοττόν.

Cf. also the passages cited supra, vol. ii. 487. Diss. xiii. ch. ii. sect. iv. from Clemens Alexandrinus, and from Porphyry.

† It may be objected indeed that this tradition or this belief is not necessarily older than the introduction of the other tradition and the other belief, (of which we gave an account supra, vol. iii. 447. Diss. xv. ch. vii. sect. viii;) whereby the natale mundi appeared to be attached to August 8: a tradition too and a belief not peculiar to the Egyptians from the first, but borrowed from the Chaldæans. A little consideration however will convince us that Horapollo's tradition is not to be explained by means of this.

The date of the introduction of this Chaldaïc tradition into Egypt, as we have seen, was August 8, B. C. 798: at which time the moon was assumed to be occupying its proper house, and its proper degree in that house, in the sphere of Mazzaroth, the xv° of Cancer; and the sun in like manner its proper house, and proper degree of that house, the xv° of Leo. The moon was consequently one sign behind the sun, and one sign complete, on August 8, B. C. 798. The true conjunction that year in August took place on August 10; at which time the sun was in the 18° = 11°,

ii. We have learnt indeed from Pliny[k], that there was a stated lunar date in the course of the synodic revolution, which the Egyptians esteemed most sacred; and we have seen that he had good foundation for what he asserted in

of Leo. The moon consequently must have been three days distant from the conjunction on August 8: and its age at that time (August 8) could not have been more than the luna 28ª. (See the calculation, instituted infra, appendix, B. C. 798.)

This traditionary date then in Horapollo of the *γένεσις κόσμου* on the 29th luna is not to be explained by that of the Babylonian cosmogony, August 8 B. C. 798. This latter however differs so little from the former that, in all probability, even this Chaldæan date of the natale mundi on the 28th luna, is ultimately to be traced up to the same traditionary belief among them, as among the Egyptians, that true lunar time, in connection with the existing system of things, did not begin *de facto*, (as might naturally have been expected,) on the luna prima, that is, at the beginning of the lunar month, but on the luna 28 or 29; that is, at or towards the end of it. And this belief, wheresoever it might be entertained, is so contrary to what was always to have been supposed *a priori*, and always to have been presumed, by men for themselves, that we cannot but consider it an evidence of a well ascertained and authentic tradition, which left no doubt of the fact itself, however contrary to probability beforehand.

Traces of the same tradition are discoverable in Persia also. In Chardin, at least, (Voyages, tome iv. p. 16, Description de la Religion, chap. i.) we find the following statement: "Les Persans ne conviennent pas non plus avec les autres peuples sur le tems du mois que la création arriva: car ils veulent que ce fut durant les six derniers jours du mois lunaire; c'est-à-dire que la création fut commencée le vingt-cinquieme jour de la lune et finie le dernier jour, de la même lune; et dans cette vue ils ont assigné au vingt-cinquieme du mois de Zilcadé la fête qu'ils ont consacrée à la memoire de la création de l'univers." And he subjoins: "Vous voyez qu'à leur compte la lune fut creée dans sa vingt-neuvieme mansion, et presq'au bout du zodiaque." As the moon passes through one mansion in one day, it could be in the 29th mansion only on the 29th luna. But, in strictness, if the moon was created on the fourth day of the hexaëmeron, and the creation began in the 25th mansion, the moon was created in the 28th mansion. The peculiarity of this Persian tradition is that it assumed the beginning of the creation on the 25th of the lunar month: on which principle the fourth day of the hexaëmeron, the day of the appearance of the moon, would actually be the 28th luna. We cannot however consider this Persian tradition particularly at present; nor how far it might agree with the Chaldaïc and the Egyptian, and how far it might differ from them.

[k] Vol. ii. 523. Diss. xiii. ch. iii. sect. v.

reference to that point. Such *was* the respect in which the Egyptians held the stated date of the Apis cycle, in his own time; the luna quarta or luna quinta. We have demonstrated however[l] that, if such was the stated date of the Apis cycle in his time, it was itself an infallible argument that the original date of that cycle must have been the luna tertia: and that being the case, there would be every reason beforehand to suppose that not only the luna *quarta* or luna *quinta*, but the luna *tertia*, and even the luna *secunda*, and the luna *prima*, at different times, but for similar reasons, must have been held by the Egyptians in the same kind of estimation.

Now there is something like proof of this fact also, in the following passage of Porphyry, quoted by Eusebius[m]: *Κατὰ δὲ τὴν Ἐλεφαντίνην πόλιν τετίμηται ἄγαλμα, πεπλασμένον μὲν ἀλλ' ἀνδρείκελον καὶ καθήμενον, κυανοῦν τε τὴν χροιὰν, κεφαλὴν δὲ κριοῦ κεκτημένον, καὶ βασίλειον, κέρατα τράγεια ἔχον, οἷς ἔπεστι κύκλος δισκοειδής. κάθηται δὲ, παρακειμένου κεραμέου ἀγγείου, ἐφ' οὗ ἄνθρωπον ἀναπλάσσειν. δηλοῖ δὲ ἀπὸ μὲν τοῦ κριοῦ πρόσωπον ἔχειν καὶ αἰγὸς κέρατα τὴν ἐν κριῷ σύνοδον ἡλίου καὶ σελήνης, τὸ δὲ ἐκ κυανοῦ χρῶμα ὅτι ὑδραγωγὸς ἐν συνόδῳ ἡ σελήνη.* This is obviously to be understood of the type of the conjunction, the *luna prima*, or of the first phasis.

Τὸ δὲ δεύτερον φῶς τῆς σελήνης ἐν Ἀπόλλωνος πόλει καθιέρωται. ἔστι δὲ τούτου σύμβολον ἱερακοπρόσωπος ἄνθρωπος ζιβύνῃ χειρούμενος Τυφῶνα ἱπποποτάμῳ εἰκασμένον. λευκὸν δὲ τῇ χρόᾳ τὸ ἄγαλμα, τῆς μὲν λευκότητος τὸ φωτίζεσθαι τὴν σελήνην παραστησάσης, τοῦ δὲ ἱερακείου προσώπου τὸ ἀφ' ἡλίου φωτίζεσθαι καὶ πνεῦμα λαμβάνειν. τὸν γὰρ ἱέρακα ἡλίῳ ἀφιεροῦσι· φωτὸς δὲ καὶ πνεύματος ἱέραξ αὐτοῖς σύμβολον, διά τε τὴν ὀξυκινησίαν καὶ τὸ πρὸς ὕψος ἀνατρέχειν, ἔνθα τὸ φῶς. ὁ δὲ ἱπποπόταμος τὸν δυτικὸν δηλοῖ πόλον, παρὰ τὸ καταπίνειν εἰς ἑαυτὸν τοὺς περιπολοῦντας. θεὸς δὲ τιμᾶται ἐν τῇ πόλει ταύτῃ ὁ Ὧρος. And this recognises the luna secunda as an object of reverence, as well as the *luna prima*, or the second phasis as well as the first.

Ἡ δὲ τῆς Εἰλειθυίας πόλις τὸ τρίτον φῶς θεραπεύει· τὸ δὲ ξόανον τετύπωται εἰς γῦπα πετομένην, ἧς τὸ πτέρωμα ἐκ σπουδαίων συνέστηκε λίθων. σημαίνει δὲ τὸ μὲν γυποειδὲς αὐτῆς τὴν γεννη-

[l] Vol. ii. 523. Diss. xiii. ch. iii. sect. vi. sqq.

[m] Præparatio Evangelica, iii. 12. § 1. 250—§ 3. 252.

τικὴν πνευμάτων σελήνην· ἐκ γὰρ τοῦ πνεύματος οἴονται συλλαμβάνειν τὸν γῦπα, θηλείας πάσας ἀποφαινόμενοι.

It is no objection to the preceding testimonies, so far as concerns this particular fact of the estimation of these three lunar terms, the phasis prima, the phasis secunda, and the phasis tertia; that Porphyry's explanation of these different representations may possibly not be correct in every respect. The figure, which he describes in the first, at Elephantine, is that of the Egyptian Noum or Noub, Kneph or Chnouphis, of whom we had occasion to give some account supra [n]: and yet this principle, as we saw, was regarded as the type of the Demiurge; and the first of its operations, even in that capacity, was supposed to have begun in Aries, and the ὕλη or elements, out of which it produced every thing, to have been these two of earth and water. And as this figure, according to the description in Porphyry, was thus forming a man of potter's clay at the conjunction, as he supposes, in Aries; so did the production of man, according to the account of Scripture, actually take place as nearly as possible at the conjunction and in Aries also. The hippopotamus, in the second instance, was probably simply a type of Typhon, for the reasons which we have already explained [o]; not of the western horizon, or of the south pole: and the flying vulture in the third representation, the wings or feathers of which seemed to be composed of precious stones, as we were informed by Mr. Birch [p], was the original symbol of the concealed deity; whose characteristic name of Amn or Amoun was afterwards transferred to Amoun-Ra of Thebes. These representations are referred to by Porphyry as proofs of the respect paid in different places and in different ways to three particular dates in the lunar synodic month, the first, the second, and the third; or to three states of the phasis, distinct from the simple conjunction, the phasis prima, the phasis secunda, and the phasis tertia: and they must be regarded as testimonies to that effect. This is a matter of fact, concerning which we should not be justified in assuming that he was mistaken. He must have been given to understand that the final end of the representation, which he describes at Elephantine, was to typify the luna prima or the first phasis; and the final end of that, which he had seen at Apol-

n Page 239. note. o Vol. iii. 189. p Supra, p. 238.

linopolis, was to characterise the luna secunda or the second phasis; and the final end of the third, which was exhibited at Eileithuiopolis, was to typify and illustrate the luna tertia or the third phasis. We must conclude therefore, on the strength of this testimony, that these lunar terms, the first, the second, and the third phasis, for some reason or other, were objects of particular consideration among the Egyptians.

iii. It will be seen hereafter[q], from actual calculation made with all possible care and exactness, that the true date of the lunar conjunction, for the proper meridian, that of the ancient Jerusalem, in the week of Creation was April 28 about 1.46 P. M. B. C. 4004, the fourth day of the hexaëmeron. Whether this moon would be actually visible for the first time, 28 hours after the conjunction, on the evening of April 29, the feria sexta *ineunte*, could not be determined for certain without the knowledge of some things concerning which we have had no information. *A priori* indeed it might not appear to be physically improbable, much less impossible, that the first phasis should have taken place within 28 hours after the first conjunction. Even in this country the moon has been seen by the naked eye within 24 hours from the change; and in the east it is often so seen. But no question like this, in reference to the first phasis, could be decided without knowing more of the climate of Paradise, and of the state of the air, as adapted to that climate, and of the other conditions on which the solution of such problems depends, than has been made known to us. It is evident however, even to our own reason, that there could be no absolute necessity for the first phasis on the evening of Thursday April 29, 28 hours after the conjunction; or that every end of the moon's becoming visible for the first time might not be equally well answered by its being first seen on the evening of Saturday May 1; by which time, three days after the conjunction, we may take it for granted it must have been capable of being seen under any circumstances, and in any climate, even that of the antediluvian world itself.

Now May 1, at evening, the seventh day of the hexaëmeron, would be the luna 4[a], reckoned from April 28 at noon. On this principle, the actual date of the first

[q] Appendix.

visible appearance of the moon, in connection with the present system of things, and in particular with human existence, would be the luna quarta, not the luna tertia, or luna secunda, or luna prima: and yet each of these lunar terms would be alike associated with the reckoning of lunar time from the first, and each, on that account, would appear to be entitled to a degree of respect and estimation, to which no one date in the synodic month could lay claim besides.

iv. The Egyptians had a tradition (attested by the funeral ritual[r]) of a Bull, "the husband of seven cows:" the exact meaning of which, at first sight, does not appear. Yet we have no doubt that both this bull and these cows were always intended of some cycle: and we can imagine no cycle, which could be typified by seven cows, but the hebdomadal. The bull being the standing type among the Egyptians either of the sun or of the moon; the object of this association of the bull and the seven cows with each other might be only to symbolize the fact, handed down by tradition, that lunar and solar time were thus associated at first with the hebdomadal cycle: as must have been the case, if both were first dated in conjunction, on the feria prima May 1 at sunset, B. C. 4004, in the second week of the Creation. On this point however every one is at liberty to judge for himself; and either to explain this mystical bull and these seven mystical cows of the ritual on this principle, or not; as he thinks proper.

It is more important for our purpose at present to observe that if May 1 at 18 hours, according to the primitive rule, or May 2 at midnight, according to the Julian, (the luna quarta in either case,) was the actual date of the beginning of civil lunar time A.M. 1, B. C. 4004; the solar or equable term, corresponding to this primary lunar term, must have been Thoth 8 at 18 hours, or Thoth 8 at midnight also, æra cyclica 1: for the first of Thoth at 18 hours æra cyc. 1 answering to April 24 at 18 hours A.M. 1 B. C. 4004, the eighth of Thoth at 18 hours would answer to May 1 at 18 hours, and Thoth 8 at midnight to May 2 at midnight. It follows that if there was such a thing from the first as a constant reckoning of solar and lunar time, the one in the primitive solar calendar, the other in the natural lunar calen-

[r] Egyptian Antiquities, part i. p. 52, 53. note 10.

dar of that primitive solar one; the proper epoch of this solar and lunar reckoning in conjunction in the equable style must have been Thoth 8. Primitive solar time by itself, in connection with the present system of things, must have borne date on Thoth 1 at 18 hours, or Thoth 1 at midnight: but primitive solar, in conjunction with primitive lunar in the sense of civil, only on the eighth day after; Thoth 8 at 18 hours or Thoth 8 at midnight, the luna quarta, not the luna prima.

Now a given equable date, like this of Thoth 8, having once become the recognised epoch of solar and lunar time in the style of the equable calendar, there is no reason in the nature of things why it might not continue to be so for any length of time. That this particular term of Thoth 8, among the Egyptians at least, was connected *de facto* with the reckoning of lunar time above any other similar term in their calendar, may be made to appear as follows.

It is agreed, that of all their divinities the most proper type and representative of the lunar reckoning of time perpetually was Thoth[s]: that none of them stood in so distinct a relation to the moon, and to lunar time, as Thoth Lunus, except their Khons or Hercules, of whom we have already given a sufficient account. Now among the titles of the Egyptian Thoth, none is better authenticated than one which designates him as the lord of Eshmoun, Shmoun or Oshmunain[t]: a designation which has given much trouble to the modern interpreters of these ancient Egyptian mysteries; not indeed to make out the literal meaning of the title itself, but to explain it on rational and consistent principles. Eshmoun or Oshmunain is considered the same with Hermupolis: but Eshmoun or Shmoun or Schmun itself, it is admitted, does not mean Hermupolis: (Ἑρμούπολις:) though if Eshmoun was one of the names of Thoth, the city of Eshmoun might be the city of Thoth or Hermes also. Eshmoun, or Shmoun, itself, involved the Egyptian term for eight: and the lord of Eshmoun, in its most literal sense and meaning, denoted the lord of the *eighth* — though what *eighth* is not agreed.

[s] Egyptian Antiquities, part i. 26, 27. Wilkinson, Second series, ii. xiii. 4–6. Bunsen, B. i. sect. vi. B. ii. 393–395.

[t] Egyptian Antiquities, p. 27. Wilkinson, Second series, ii. xiii. 7. pl. xlv. xlvi. Bunsen, i. 393–395, cf. 399.

What then could be the meaning of such a title, applied to Thoth? or what particular reason could there be, for designating him in this manner, as the lord of the eighth of any kind? Is it not explained at once, as soon as it is known that Thoth was the impersonation of lunar time; that Thoth was the lunar calendar in a living form? and that the lunar calendar, and lunar reckoning, among the Egyptians, had a stated epoch from the first; and that epoch the 8th of Thoth; the eighth of the month, consecrated to and called after Thoth himself? What was this but to set him forth in relation to the moon, as the lord of Eshmoun from the first?

The cynocephalus too, as we have often had occasion to observe[u], being the creature of Thoth, and constantly associated with him, it is not unusual to find the representation of this animal also on the monuments, in attendance on Thoth or on some other divinity who cannot be distinguished from Thoth; yet in connection with this particular number of eight. Of the number of such divinities, the character of which was interchangeable with that of Thoth, was *Moui* or Meui, described in the Egyptian Antiquities[x]. In the funeral ritual or book of the dead[y], Moui is exhibited elevating the disk of the sun[x], which is saluted by eight cynocephali; the legend at the same time declaring[x] that "Moui, the abime of the heaven, on the steps of the inhabitants of Eshmoun, afflicts the race of the wicked on the steps of the residents in Eshmoun:" these residents in Eshmoun, on the steps of which Moui thus stands to inflict this vengeance, as it further appears from the same ritual[z], being these cynocephali themselves. We meet with sculptures in which lunar days are denoted by steps. Thus 14 steps, leading up to an eye, are often employed to represent the lunar πανσέληνον or first half of the lunar month[a]. We have no doubt that these cynocephali, thus limited to eight or thus connected in some manner with the number eight yet associated with Thoth or with Moui also, are to be explained on the same principle as the name of Eshmoun, applied to Thoth himself*.

* In strictness, the first eight days of the month Thoth, to which we

u Cf. Horapollo, i. 14, 15. Wilkinson, Second series, ii. xiii. 4, 5.
x i. 22. 26. 38.
y Cf. Bunsen, i. sect. i. A. iv. p. 25–28.
z Egyptian Antiq., part i. 26.
a Denon, pl. lxxii. p. 91. Tentyra and Apollinopolis, Nos. 2 and 3.

v. The same solar term might continue nominally to represent the epoch of lunar time in the equable calendar perpetually; but it could not always represent it truly. This lunar epoch at first might be the luna tertia. The solar term to which it was attached at first might be the 8th of Thoth; and this solar term might nominally continue the same ever after: but the lunar term, originally associated with it, could not possibly continue attached to it as at first. There would be two causes, of constant operation, to prevent this. One of these would be the correction of the Julian types of our Fasti. As often as we assumed a fresh Julian type of the natural year, the lunar term, attached to the 8th of the solar

suppose a reference in this title, were not lunar, but solar days: and in strictness the cynocephalus, as we have already more than once observed, was sacred to Thoth in his relation to solar rather than to lunar time. Sometimes nine cynocephali are found in conjunction on the monuments; for instance (Monuments de l'Égypte, tome i. lxxxii. 3) at Philæ; a cynocephalus seated on a pedestal, with 9 steps, and with the lunar disk on its head, and over against Thoth with the Ibis-head; and at the head of the coffin of Amyrtæus, described by Mr. Birch, (Egyptian Antiquities, part i. p. 49,) there were two sets of these animals, each of them nine in number; one of which was styled "door-openers of the sun;" the other, "bards of the sun." This number nine might come to be associated with these animals, as the types of Thoth and as the representatives vicariously of his relation to the lunar year, for two reasons. One, because, as we shall see hereafter, the proper Apis cycle of the Egyptians, B. C. 973, was derived from the primitive cycle of the same kind, and took its rise in the *eighth* solar, but *ninth* lunar, year of the cxxii primitive cycle of that description: the other, because even B. C. 973, when the cyclical epoch of the Apis cycle was attached to Thoth 11, the Nabonassarian at the same point of time was falling on Thoth 9: so that the true lunar epoch of the cycle in the Nabonassarian type of the equable year from the first was Thoth 9: and having once been attached to that date, mutatis mutandis only, it must continue attached to it ever after. By this Nabonassarian date of the cycle however, Thoth 9, we mean of course the luna tertia, not the luna quinta. It is to be observed also, that B. C. 973, as we shall see by and by, Thoth 9 in the cyclical style of the equable year was the date of the true luna prima. For any of these reasons the cynocephalus in its proper relation to Thoth Lunus might come to be associated with the number 9, as well as with the number 8. We much question however whether it has ever been found, or ever will be found, associated with a less number than this of 8, or a greater than this of 9; or in particular with any such number as 10 or 11—though the 11th of Thoth was the proper equable date of the Apis calendar, properly so called, from the first.

Thoth, would rise one number higher in the equable style. Thus, we assume such a fresh type for the first time A. M. 112 B. C. 3893 æra cyc. 112. The first cycle of 25 years, which would be in course after that, would bear date æra cyc. 126 A. M. 126 B. C. 3879. The first of Thoth in that year answered to March 26: the 8th of Thoth to April 2. And April 2, as our lunar calendar shews, the same year was the luna *quinta*, not the luna *quarta*; so that, in consequence of the correction of our Julian calendar A. M. 112 æra cyc. 112, the true lunar date, corresponding to Thoth 8, at the beginning of the next cycle of 25 years would be found to have risen from the luna *quarta* to the luna *quinta*; the equable solar term to which it corresponded, Thoth 8, continuing nominally the same notwithstanding. And it would be easy to shew that as often as we repeated the same correction, by the assumption of a fresh Julian type of the natural year, this effect would be repeated also. The lunar epoch of the cycle of 25 years would rise one day in terms with every fresh Julian type; the solar epoch of Thoth 8 corresponding to it continuing nevertheless the same.

The other cause would be the necessity of correcting at stated times the cycle of 25 years itself; a cause as inevitable and as regular in its effect as the former, though comparatively slower in its operation. It is not possible, as we have often had occasion to observe, for true lunar time to be perpetually represented by any cycle without correction. All cyclical, civil, or calendar reckonings of lunar time must either gain or lose in comparison of natural: the octaëteric or the hekkaidekaëteric must lose; the Metonic or the Apis must gain; though the latter at a much slower rate than the former: for we have already shewn[b] that the Apis cycle might be used without correction, as the measure of true mean lunar time, almost twice as long as the Metonic. Strictly speaking indeed, while the civil lunar calendar continues to be administered in conformity to its own principles, it neither gains nor loses, but continues always the same. It is the moon in reality which gains or loses on a calendar of this kind; which gains on the octaëteric, and loses on the Metonic, or on the Apis. But the effect is the same, whether

[b] Vol. i. 112. Diss. iii. ch. iii. sect. vii.

true mean lunar time is supposed to be a constant quantity, and its civil or calendar measure a variable one; or *vice versa*. A correction will be required, and a correction must be applied, at last, to accommodate one to the other, for the same length of time as before; the subject of which correction of course must be the calendar or civil reckoning of lunar time, in order to adjust it again to the natural, even on the principles of the calendar reckoning itself.

We will assume at present that, in the case of the cycle of 25 years, the interval of time, for which the calendar reckoning of lunar time in conjunction with solar was calculated to go on at first, without requiring a correction, was 600 equable years, or 24 cycles of 25 years: an assumption the truth of which will be made to appear by and by. It follows that, at the end of 600 equable years, this cycle must require a correction, and a correction amounting to a day; a correction which nature itself would administer, if it was not administered in any other way, by the descent or precipitation of true lunar time one entire day in terms of civil. The solar epoch of the cycle might continue the same even in this case; but the lunar epoch, corresponding to it before at the beginning of these 600 years, must necessarily rise one day higher to correspond to it still at the end. And as in 600 equable solar years we could not correct our Julian calendar less than four times; it would follow from this effect, along with the former which we have already explained, that the same nominal solar term, like Thoth 8, which began with corresponding to the luna quarta at the beginning of one of these periods, at the end of one such period, and at the beginning of the next, would be found corresponding to the luna *nona*.

Thus the first equable period of 600 years came to an end and the second began Thoth 1 æra cyc. 601, November 30, A. M. 600, B. C. 3405: and the 8th of Thoth corresponded that year to December 7. The principal new moon of the same year, according to our general lunar calendar, bore date April 7 at 18 hours: but this being the 11th year of the xvith cycle of the current period of 304 years, it is manifest that the calendar dates were now nearly 24 hours in excess of the mean. We may assume the date of the new moon of

our Nisan this year April 7 at midnight: from which it will follow that the date of our Chisleu, the ninth moon, would be November 29 at midnight: i. e. Epagomene 5 at midnight: and consequently the ninth luna of that moon Dec. 7 at midnight or Thoth 8 at midnight. We see then that in 600 equable years the true mean lunar date, corresponding to the same nominal solar and equable date, must have risen from the luna *quarta* to the luna *nona*. And this is no more than the necessary effect of both the causes which have just been pointed out. This first equable period of 600 years came to an end in the midst of our fifth Julian period: i. e. we had changed our Julian types of the natural year *four* times in the course of this *one* equable period of 600 years, which had entailed a rise of four days in the perpetual lunar reckoning of the period along with the solar; and true mean lunar time in the same interval of time had lost an entire day on cyclical, which entailed a rise of one day more: so that the lunar epoch of the period, in order to correspond to the solar at the beginning of the next period of 600 years, must be found to have risen five days, compared with what it was at the beginning of the preceding; that is, from the luna *quarta* to the luna *nona*.

It follows that were we to draw out a scheme of the first cycle of 25 equable years, adapted to this hypothesis of its setting out on the luna quarta in the lunar reckoning, and on the 8th of Thoth in the solar reckoning of the cycle, it could not serve, in strictness, for more than the first of our Julian types; and yet it would be easy to correct and adjust it in such a manner, at the end of the first of these types, as to be equally competent to serve for the next; and so on perpetually: viz. by allowing the solar epoch of the cycle, Thoth 8, to remain the same in terms all along, but by raising the lunar, (the *luna quarta,*) at the end of each Julian period one day as if *secundum ordinem*, and at the end of each period of 600 equable years one day more as if *extra ordinem*. And on this principle, it would be easy also to exhibit a succession of such cyles of 25 years, adapted to the same solar epoch, but to a different lunar one, for the first 24 periods of our Fasti; from A. M. 1, B. C. 4004, to A. M. 3024, B. C. 981—com-

prehending cxxi cycles of 25 years, and 3025 cyclical years—such as we shall actually propose by and by.

vi. A succession of cycles of this kind however being supposed to have been thus drawn out; we observe, in the next place, that in these 3024 mean Julian years, comprehended by this succession of cycles of 25 years, we have necessarily corrected our Julian calendar 24 times; that is, we have assumed 24 different Julian types of the mean natural year: and secondly that, in the 3025 cyclical years, comprehended by the same series of cycles also, there must have been five periods of 600 equable years complete. It follows, that if the lunar epoch of the first of these cycles was the luna quarta, (the solar remaining all along the same, Thoth 8,) that of the last, the cxxiid must be found to have risen to the luna 33a $(4+24+5)$. It would be evident therefore that the lunar epoch of the cycles at this point of time would be found to have risen an entire month of 30 days and three days over: and 30 days being the stated length of the last lunation in the Apis cycle, we should be justified, at this moment, in casting off 30 days from 33, considered as equivalent to the last month of the preceding cycle; or what would amount to the same thing, in suppressing the last month of the cycle, and beginning a new lunar reckoning, on the same solar term as before, Thoth 8, but on the luna tertia instead of the luna 33a. And supposing this to have been done, it is manifest that just at this moment the solar and the lunar reckoning of these cycles would be brought back to their original relation one to the other, for the first time too in 3025 cyclical years, 121 cycles of 25 years: for it is self-evident that, this correction having been made in the xxixth type of the cycle, there would be little difference between that and the first.

Types of the Εἰκοσιπεντετηρὶς of Primitive Antiquity, from Æra Cyclica 1 to Æra Cyclica 3026: Solar term, Thoth 8, Lunar term, a variable one, from the Luna 4a of origination to the Luna 3a.

Æra Cyclica 1 and Æra Cyclica 3026	Æra Cyc. 1	Æra Cyc. 126	Æra Cyc. 276	Æra Cyc. 376	Æra Cyc. 526	Æra Cyc. *601	Æra Cyc. 626	Æra Cyc. 776	Æra Cyc. 901	Æra Cyc. 1026	Æra Cyc. 1151	Æra Cyc. *1201	Æra Cyc. 1276	Æra Cyc. †1401	Æra Cyc. 1551	Æra Cyc. 1676	Æra Cyc. *1801	Æra Cyc. 1926	Æra Cyc. 2051	Æra Cyc. 2201	Æra Cyc. 2301	Æra Cyc. *2401	Æra Cyc. 2451	Æra Cyc. 2501	Æra Cyc. 2651	Æra Cyc. 2751	Æra Cyc. 2901	Æra Cyc. *3001	Æra Cyc. †3026
Type i and Type xxix	Type i	Type ii	Type iii	Type iv	Type v	Type vi	Type vii	Type viii	Type ix	Type x	Type xi	Type xii	Type xiii	Type xiv	Type xv	Type xvi	Type xvii	Type xviii	Type xix	Type xx	Type xxi	Type xxii	Type xxiii	Type xxiv	Typ xxv	Type xxvi	Type xxvii	Type xxviii	Type xxix
Luna 4a or Luna 3a	Luna 4a	Luna 5a	Luna 6a	Luna 7a	Luna 8a	Luna 9a	Luna 10a	Luna 11a	Luna 12a	Luna 13a	Luna 14a	Luna 15a	Luna 16a	Luna 17a	Luna 18a	Luna 19a	Luna 21a	Luna 22a	Luna 23a	Luna 24a	Luna 25a	Luna 26a	Luna 27a	Luna 28a	Luna 29a	Luna 30a	Luna 1a	Luna 2a	Luna 3a

☉	☽		
i	i	Thoth	8
i	ii	Epagomene	2
ii	‡ iii	Mesore	21
iii	iv	Mesore	11
iv	v	Epiphi	30
v	‡ vi	Epiphi	19
vi	vii	Epiphi	9
vii	viii	Paüni	28
viii	‡ ix	Paüni	17
ix	x	Paüni	7
x	xi	Pachon	26
xi	‡ xii	Pachon	15
xii	xiii	Pachon	5
xiii	xiv	Pharmuthi	24
xiv	‡ xv	Pharmuthi	13
xv	xvi	Pharmuthi	3
xvi	xvii	Phamenoth	22
xvii	‡ xviii	Phamenoth	11
xviii	xix	Phamenoth	1
xix	xx	Mecheir	20
xx	‡ xxi	Mecheir	9
xxi	‡ xxii	Tybi	29
xxii	xxiii	Tybi	19
xxiii	xxiv	Tybi	8
xxiv	‡ xxv	Chœac	27
xxv	xxvi	Chœac	17

‡ Intercalary years of 355 days.

Last nine months of every cycle.

Months	Days	Type i and xxix	
i	30	Chœac	17
ii	29	Tybi	17
iii	30	Mecheir	16
iv	29	Phamenoth	16
v	30	Pharmuthi	15
vi	29	Pachon	15
vii	30	Paüni	14
viii	29	Epiphi	14
ix	30	Mesore	13
i	30	Thoth	8

‖ *Note.*

These types are supposed to begin in each instance with the first cycle of 25 years, which comes in course next after the assumption of a fresh Julian type of the Fasti; or next after a complete period of 600 equable years.

The asterisk (*) denotes those types which coincided with a fresh period of 600 equable years; the obelus (†) those which coincided with a fresh Julian period of the Fasti.

In one instance, type xvii, the same type entered next after the assumption of a fresh period, and coincided with a fresh period of 600 years. The lunar epoch therefore at the ingress of this type rose two numbers at once, from the luna 19a to the luna 21a. The solar epoch of the 1st type, Thoth 8, is that of every other also: but it agrees with a different lunar date in each type, from the luna 4a type i to the luna 3a type xxix.

Section III.—*On the derivation of the Apis cycle of* B.C. 973, *æra cyclica* 3034, *from the* xxix*th type of the* εἰκοσιπεντετηρὶς *of primitive antiquity.*

Having come down with the preceding scheme to A. M. 3024, B. C. 981, æra cyclica 3026, we have come within eight years only of the date of the Apis cycle; the εἰκοσιπεντετηρὶς of Egyptian history, A. M. 3032, B. C. 973, æra cyclica 3034: and it should never be forgotten that though, in imitation of the example of chronologers generally, we have given the name of the Apis cycle to this lunar and solar period of 25 years even from the first; there was in reality no such thing as the Apis cycle, properly so called, before the introduction of the worship of the Apis into Egypt, in this very year, æra cyclica 3034 itself.

In a succession of cycles of this kind then, brought down from the first according to one and the same law, this historical cycle of the Apis must have taken its rise in the cxxiid; and the first year of that Apis cycle must have been coincident with the 8th solar year, equivalent to the 9th lunar year, of this more ancient cycle of the same kind, the cxxiid in order from the first; the stated date of which in the original type of that more ancient cycle, and in the xxixth type, as readjusted to that original one, æra cycl. 3026, and made the same with it at this time as much as at first, it appears from our scheme of both, was Païni 17.

And hence the strongest confirmation, from the testimony of the matter of fact, of the truth of the conclusion which we began with proposing to establish: viz. That equable lunar in conjunction with equable solar time must have been brought down among the Egyptians at least from A. M. 1 B.C. 4004 æra cyclica 1 to A. M. 3024 B. C. 981 æra cyclica 3026: and, as it must now appear, in a succession of types exactly analogous to those which we have just exhibited. If it can be shewn that the actual epoch of the actual historical succession of that kind, (the succession which we have ourselves investigated, illustrated, and confirmed so much at large, in these dissertations on the Apis cycle, by means of totally distinct and independent data); if it can be shewn, we say, that the proper date of the Apis cycle itself was taken directly

from the 9th year of the 29th type of this more ancient cycle, with which it coincided itself at the time; the proof of this conclusion, we apprehend, will be made out to the satisfaction of any reasonable person.

The most remarkable circumstance about this historical cycle is this: That it was attached to the third of the lunar and to the eleventh of the solar month; instead of to the first of each. Each of these facts has been placed out of all question: and we can neither doubt of the fact of the coincidence, nor yet of its being designed and intentional; not fortuitous. Neither does it admit of a question that whatsoever was the reason which induced the Egyptians to fix on æra cyclica 3034, B. C. 973, as the first year of their first Apis cycle, properly so called; *that* is the year *de facto* in which it took its rise. Now this year corresponds to the 9th year of the cxxiid cycle of 25 years, brought down from the first; and the stated date of the 9th year of the cycle, whether in type i or in type xxix, was Paüni 17.

Εἰκοσιπεντετηρὶς *of primitive antiquity.*

Cycle cxxii. 9. Æra Cyc. 3034.

i	Month	30	Paüni	17	Luna 3ª
ii	—	29	Epiphi	17	—
iii	—	30	Mesore	16	—
iv=i.			Thoth	11	Luna 3ª

We see then that the stated solar date of the fourth month in this year of the cycle would be Thoth 11, the lunar, the luna tertia. If then it was proposed at this time to make the *ninth* lunar year of the cxxiid cycle, brought down from the first, the *first* year of a new series of cycles which was destined to take up and carry on the old, only in a new form and under a new name; from what would the date of this new succession be taken except from the date of the fourth month in the current year of this cycle, the nearest lunar term in that year of the cycle to the beginning of the year itself? by which means it would at once be attached both to the 11th of the solar and to the 3d of the lunar month; as in fact it was. There cannot, we think, be a better explanation than this of a matter of fact which in itself is unquestion-

able and yet without some explanation would still be more or less improbable; and we are persuaded that every unprejudiced person will be of this opinion too. It is not surprising that the first year of the first Apis cycle should exhibit the same phenomenon as the ninth year of the older cycle of the same kind, with which it certainly coincided; and that the first month of the former should have had precisely the same lunar and solar characters as the fourth month of the latter, with which it must have been identical also. Why indeed the 9th year of the cxxiid cycle from the first was selected to be the first year of the Apis cycle is another question, on which nothing has yet been said; and which we may possibly be able to answer or we may not: but, whether this question can be answered or not, the fact itself will still be the same, that the first year of the first Apis cycle was the ninth year of the cxxiid cycle of 25 years brought down from the first; and the lunar and solar epochs of the first month of the former were absolutely the same as the lunar and solar epochs of the fourth month of the latter: a coincidence which we cannot resolve into chance; and which, if it cannot be explained on that principle, must have been the effect of design. If so, the Egyptians had among them even in æra cyclica 3034 the cycle of 25 years brought down from the first; and what is more, in a succession of cycles and types, altogether analogous to those which we ourselves have exhibited *supra*.

SECTION IV.—*On the choice of the epoch of the Apis cycle,* B. C. 973. *On the period of* 600 *years.*

There is a well known passage of Josephus, where he is speaking of the extraordinary length of life conceded to the antediluvian patriarchs, and is endeavouring to assign some probable reasons for it. Among these, one is the necessity, as he supposes, of their living 600 years at least, in order to make any proficiency in geometry or in astronomy[c]: Ἔπειτα καὶ δι' ἀρετὴν καὶ τὴν εὐχρηστίαν ὧν ἐπενόουν, ἀστρολογίας καὶ γεωμετρίας, πλέον ζῆν τὸν θεὸν αὐτοῖς παρασχεῖν. ἅπερ οὐκ ἦν

[c] Ant. Jud. i. iii. 9.

ἀσφαλῶς αὐτοῖς προειπεῖν μὴ ζήσασιν ἑξακοσίους ἐνιαυτούς· διὰ τοσούτων γὰρ ὁ μέγας ἐνιαυτὸς πληροῦται.

A certain measure of the annus magnus, the oldest of its kind too, as old in fact as the antediluvian world, is thus recognised in the period of 600 years. We have met with no testimony to this particular period, so distinct and positive as this of Josephus: and yet it may be collected from Diodorus' account of the adventures of one Iambulus[d], that a period of the same number of years was known to the ancient Ethiopians; and that a reckoning of time, by periods of 600 years, in some manner or other, was actually kept among them. The simple period of 600 years will be recognised as the measure of the Chaldaïc Nerus[e]: but the Nerus was necessarily connected with the Sossus and the Sarus also; nor could it be regarded as an isolated period of its kind. This term of 600 years, the supposed measure of the annus magnus of antediluvian antiquity, is evidently proposed by Josephus as a distinct period, totally unconnected with any thing else.

The illustrious Dominic Cassini appears to have been much struck by the period, thus mentioned in Josephus[f]: and having analyzed it, and found it to bring back the solar and lunar momenta to the same state of relation to each other, and to the truth, with considerable closeness and precision; he proposed that chronologers should adopt it as a measure of time, dignified by the name of the Periodus Louisiana, in honour of Louis the Great. The opinions of Cassini are entitled to great respect: in this instance however it is morally certain that he mistook the nature of the period; which was not one of 600 mean natural or mean Julian years, but one of 600 equable years.

We have already explained[g] that, from the necessity of the case, in the course of a certain number of years the true reckoning of mean natural lunar time must lose a day on the civil or calendar reckoning of the same thing even in the

[d] ii. 55–60.

[e] See supra, p. 94. Diss. xv. ch. xiii. sect. ii.

[f] Mémoires de l'Academie des Sciences, viii. p. 5, 6. Ann. 1699: cf. Bailly, Histoire de l'Astronomie Ancienne, Liv. iii. § vi. 66: Éclaircissemens, Liv. ii. § vi. 309, 310.

[g] Supra, p. 379.

cycle of 25 years. The question is only in what number? If the astronomical doctrine of the constant acceleration of the mean lunar momenta, from a much more remote point of time than the epoch of the Mosaic creation, is true; two conclusions follow from it: one that no standard of the mean synodic month can have been invariable from the epoch of the Mosaic creation downwards; the other that the greatest standard of this kind which could ever have held good, within the limits assignable to the existence of the present system of things, must have been that which held good at first, or at the epoch of the Mosaic creation itself.

We have already assumed that the proper length of time, in which the mean natural lunar revolution and the calendar or cyclical, once adjusted to each other at the beginning of things in such a cycle as this of 25 equable years, were calculated to go on in conjunction at first, without standing in need of correction, was the period of 600 equable years; and this assumption we must now proceed to illustrate and to establish. And both the illustration and the proof of it will be complete, if it can be shewn that the mean standard of the synodic month, deducible from the period of 600 equable years, and the mean standard, which may be obtained from the formulæ devised by modern astronomy, at the epoch of the Mosaic creation were as nearly as possible the same.

i then: The number of mean solar days in 600 equable years is 219 000: and diminished by unity, 218 999. The number of cycles of 25 years, in the same period of time, is 24: and the number of lunar months, (whether natural or civil,) at the rate of 309 in each cycle of 25 years, is 309 × 24 or 7416. We shall therefore obtain the average length of every lunation of the period, by dividing 218 999 mean solar days by 7416.

Number of mean solar days in 600 equable years, diminished by unity	218 999.
Number of months, or synodic revolutions ..	7416.
Average length of each month, or mean standard of the synodic lunar revolution, deduced from the period, ...	29 d. 12 h. 44 m. 4 s·660 194.

ii. The secular correction of the mean synodic lunar revolution is mathematically deducible from that of the mean lunar motion in longitude, according to the particular formula which may be assumed for this latter. The formula for the secular correction of the mean motion in longitude, which we have adopted, is that of Damoiseau[h]; and from this, through the kindness of professor Challis, as we have already explained[i], we have been supplied with the secular correction of the mean synodic period.

The problem therefore, which we have to solve in the first instance, being this of the true length of the mean synodic revolution at the epoch of the Mosaic creation, A. M. 1 B. C. 4004, we refer to the calculation already instituted, for that purpose[i]; by which we found it 29 d. 12 h. 44 m. 4 s · 535 360 124 08.

Hence, for the period of 600 equable years, diminished by one day, we have the

		d.	h.	m.	s.
Mean synodic revolution, ...	=	29	12	44	4·660 194
By formula, we find it, B. C. 4004 ..	=	29	12	44	4·535 360
Difference of standards					0.124 834

It thus appears that the standard of the mean synodic revolution, obtained from the period of 600 equable years *minus* one day, at the epoch of B. C. 4004, and the standard deduced from formula, for the same point of time, differ from each other only by this quantity of 0 sec · 124 834; that is, little more than the tenth of one second of mean time, by which the former exceeds the latter. And whether this difference itself may not be accidental, and possibly due to some inadequacy of the formula for the secular correction of the mean motion in longitude, when applied to so remote a period as B. C. 4004, may be open to question; and must be left to the judgment of astronomers. We think it may be safely assumed, as the result of the above comparison, that the average length of the natural synodic revolution, deducible from the hypothesis that 7416 such revolutions would contain one day, but only one day, less than 24 cycles of 25

h See vol. ii. 514. Diss. xv. ch. ix. sect. iv.

i Vol. ii. 25. Diss. ix. ch. i. sect. vii.

equable years, or 600 equable years, and the mean length of the same thing, at the epoch of the Mosaic creation, deducible from theory and from the formulæ supplied by astronomers, must have been remarkably in agreement one with the other. From which it must follow that, supposing the natural lunar calendar to have been actually associated with the primitive solar one, in the shape of this cycle of 25 years, at the epoch of the Mosaic creation, it would not require a correction of a day in less than 600 years. The period of this cycle, in the first instance of all, from B. C. 4004, A. M. 1, æra cyclica 1, downwards, would be the period of 600 equable years.

Now, this standard of the mean synodic period, 29 d. 12 h. 44 m. 4 sec· 660 194, being assumed as that which held good *de facto* at the epoch of the Mosaic creation, and consequently at the beginning of lunar time itself in conjunction with the present system of things; it must be regarded and treated for a time as something perpetual, as something fixed of its kind: though in reality it would begin to be affected by the lunar acceleration from the moment of the assumption itself. It is inseparable however from the nature of a cyclical or calendar reckoning, to make use of mean standards only; and of standards which having been once assumed must be treated for a time as constant, and incapable of change. Nor is there any reason in the nature of things why they should not be so treated, at least for a time; the only question, in a case like this, should be for what length of time? And in a case like this too, in which distinctions and differences scarcely appreciable by any sensible measure of such distinctions, and proportionably slow in the process of generation, have to be estimated and taken into account; every one must allow that it would be altogether reasonable *a priori*, to retain the original standard of the mean synodic revolution, assumed at the epoch of B.C. 4004, whatsoever that was, until the difference between that and the truth, produced by the constant operation of the law of the lunar acceleration meanwhile, was found to have accumulated to *one* second of mean time complete. The question is then, when would that first be found to be the case? And the

answer to this question is the discovery of a remarkable coincidence; viz. that, as far as we are able to judge, this point of time appears to have been actually that at which the Egyptians laid aside the primitive cycle of 25 years, and assumed a new cycle of the same kind, in the shape of the Apis cycle, in its stead.

The date of this change of the cycle was A. M. 3032 B. C. 973: which would be 27·73 centuries anterior to A. D. 1801. In this case, to find the true mean synodic period adapted to B. C. 973, from the formula of which we make use, we must assume $\kappa = 27{\cdot}73$ centuries, and $\kappa^2 = 768{\cdot}952\,9$. We have then,

	s.		s.
	$+\ 0{\cdot}034\,136\,\kappa$	=	$+\ 0{\cdot}946\,591\,3$
	$-\ 0{\cdot}000\,092\,45\,\kappa^2$	=	$-\ 0{\cdot}071\,089\,7$
Correction, 27·73 centuries		=	$+\ 0{\cdot}875\,501\,6$

	d.	h.	m.	s.
Mean synodic period, A. D. 1801	29	12	44	2.865 537 6
Correction, 27·73 centuries				+ 875 501 6
Mean synodic period, B. C. 973	29	12	44	3·741 039 2
Standard of the period of 600 equable years minus one day	29	12	44	4·660 194
Standard of B. C. 973 by formula ..	29	12	44	3·741 039
Difference				0·919 155

It is manifest therefore that at this moment the standard of origination, the standard obtained from the period of 600 years, and assumed and applied until now, may be considered to have been as nearly as possible one second of mean time in excess of the truth. It is evident consequently that just at this juncture true mean lunar time was becoming liable to lose more than one day, in comparison of calendar lunar time, in 600 equable years; and therefore that some change must be necessary in the length of this period, if true lunar time was not to lose more than one day in comparison of civil, in one such period.

Now this correction would be applied to the period by assuming its length at 550 equable years, 22 cycles of 25 years; instead of 600 years and 24 cycles: or by administer-

ing the calendar, from this time forward, on the hypothesis that true mean lunar time was liable to lose a day on civil in 550 equable years or 22 cycles of 25 years: as may thus be shewn,

The number of days in 550 equable years, diminished by unity	=	200 749.
The number of synodic revolutions (whether natural or civil) in 22 cycles of 25 years ..	=	6798
The average length of each revolution, resulting from the division of the former by the latter, is		d. h. m. s. 29 12 44 3·601 059

The difference between this standard, and that which we obtained from the period of 600 years, is as nearly as possible one second:

	d.	h.	m.	s.
Period of 600 years,	29	12	44	4·660 194.
Period of 550 years,	29	12	44	3·601 059.
				1·059,135.

and the difference between it and the standard obtained by formula for B. C. 973 is not much more than one tenth of a second.

	d.	h.	m.	s.
Standard by formula, ..	29	12	44	3·741 039.
From the period of 550 years,	29	12	44	3·601 059.
				0·139 980.

It cannot be denied that these are singular coincidences. Nor can there be any doubt that, were this comparison of both kinds of lunar time to be continued sufficiently long in the same way; it would be found in the course of time that the true had begun to lose a day on the civil in 525 equable years, or 21 Apis cycles: in which case the mean standard deducible from the period would be 29 d. 12 h. 44 m. 2s·995 839; a standard which would be found from the application of the formula to have begun to hold good about four centuries anterior to A. D. 1801, A. D. 1401. But it would not be found within the compass of time embraced by our own tables that true mean lunar time was ever liable to gain one day on civil in the cycle of 25 years in 500 equable years; for that would suppose the average length of the Apis synodic

revolution to be 29 d. 12 h. 44 m. 2 s·330 097 : and that is a standard to which the mean synodic period according to our formula cannot be actually reduced before A. D. 3401 at least, sixteen centuries to come from A. D. 1801.

It is evident however that this standard of 29d. 12h. 44m. 3 sec·601 059, which began to be true about B. C. 973, was calculated to hold good for more than a thousand years afterwards without undergoing any very sensible diminution of its value. In fact we find it assumed by Ptolemy that the defect of 309 mean synodic lunations on 25 equable years, for his own time, A. D. 140 or thereabouts, in mean solar time was only 2′ 47″ 5‴ of the sexagesimal notation = 1 h. 6 m. 50 sec. of ours : Ἐπεὶ δὲ καὶ ἐν κε′ ἔτεσιν Αἰγυπτιακοῖς λείπουσι μιᾶς ἡμέρας (αἱ σύνοδοι) ἑξηκοστοῖς δυσὶ μζ′ ε′, ὅλοι τε μῆνες ἔγγιστα ἀπαρτίζονται [i].

This being subtracted from 9125, the number of mean solar days in one cycle of 25 years, and the remainder, 9124 d. 22 h. 53 m. 10 sec. being divided by 309 ; the average length of each is found to be 29 d. 12 h. 44 m. 3 sec· 333,333 : very nearly the same as that which results from the formula for A. D. 140, 16·6 centuries before A. D. 1801, 29 d. 12 h. 44m. 3 sec · 406 72 ; and still nearer to Ptolemy's own, which was also that of Hipparchus, 29 d. 12 h. 44 m. 3 sec. 20 th. or 29 d. 12 h. 44 m. 3 sec· 333 also [k].

If then the question be asked, what it was which might have induced the Egyptians to make a change in the cycle of the primitive lunar calendar for the first time, B. C. 973 æra cyc. 3034 ; it may not be in our power to answer that question, if the answer is not supplied by the fact that the time chosen for this correction, or for this remodelling of the primitive cycle of 25 years, was also the time selected for the introduction of the worship of the Apis. There were no doubt peculiar reasons, (amply sufficient to account for the fact, had they only been handed down to us,) for fixing the date of the introduction of the worship of the Apis, to this particular period. The date of the first Apis cycle of 25 years after all was only eight years later than that of the

[i] Magna Compositio, vi. ii. 576.
[k] See vol. i. 70. Diss. ii. ch. ii. sect. v.

cxxiid primitive cycle of the same kind. And as both the solar and lunar epochs of this new succession of such cycles were taken directly from the solar and lunar epochs of the corresponding month in the corresponding year of the old; it is clear that this new succession neither was in point of fact, nor could ever have been intended to be, independent of the old.

It is far from improbable indeed that, in fixing the epoch of this new succession to the 9th year of the current cycle of the old instead of to the 1st; the object proposed by the Egyptians was to begin the reckoning of lunar time in this new succession under circumstances as nearly as possible the same with those under which the same succession began at first. It must have been remembered in Egypt, even at this time, that lunar time in that succession had begun to be reckoned from the *luna tertia* in the sense of the *third phasis:* and lunar time, in this new succession, was appointed to be reckoned at first from the *luna tertia* too. It must have been still remembered that the proper solar or equable date of this first *luna tertia* was the 8th of Thoth; while the Julian date corresponding to both was the 2d of May: that is, the proper Julian date of the origin of lunar time, on this principle, was May 2. Now the Julian date of the equable one of the first year of the cxxiid cycle of 25 years, brought down from the first, Thoth 8 æra cyclica 3026, was April 30 B. C. 981: but that of the equable date of the 9th year, æra cyclica 3034, Thoth 11, was May 1 B. C. 973: the lunar date corresponding to both being the same, the *luna tertia* in each instance alike. It is manifest then that, in fixing upon the proper epoch of their Apis cycles, the Egyptians had to choose not between two lunar dates, the *luna tertia*, and any other; but between two solar and equable ones, Thoth 8 and Thoth 11, and two solar and Julian terms, April 30 and May 1: and as the two latter were virtually the same with the two former, and *vice versa*, if they decided in favour of Thoth 11 instead of Thoth 8, it is to be presumed it was for the sake of the Julian date with which it virtually coincided, May 1 in preference to April 30: and that that date was considered the most desirable, because of

its connection with the origin of lunar time itself. It is not to be supposed, that such artful and cunning contrivers, as the authors of this fable of the Apis, would overlook a coincidence, which was more calculated to give credibility and authority to the fable which they were desirous of bringing into vogue, than any thing which could have been imagined or pretended besides. For on what day could a cycle, like that of the Apis, be expected to begin, but one which was the epoch of all such cycles from the first? or on what day but the true birthday of lunar time itself would Osiris condescend to become the living representative of the lunar calendar, in the person of the Apis? In a word, it does not appear that there was any alternative except to begin the new succession of cycles of the same kind in the ninth year of the old. And as the fact is certain, that the first year of the new succession was actually attached to the ninth of the old; we must conclude that it was so either from some strong sense of the necessity, or from some strong conviction of the expediency and policy, of so fixing it.

SECTION V.—*On the date of the true lunar conjunction at the epoch of the Apis cycle: and on other peculiarities connected with the first Apis cycle.*

These questions then having been disposed of, we shall proceed to certain other subjects of consideration, which are necessary to complete the account of the Apis cycle. One of these is the date of the true lunar conjunction, the *luna tertia* of which was constituted the epoch of the cycle; that is, the true new moon of the month of April, for the meridian of the ancient Memphis, B. C. 973. This *luna tertia* being supposed the same as the 11th of Thoth, æra cyclica 3034, it must have been reckoned according to the Julian rule from May 1 at midnight, and according to the primitive rule from April 30 at 18 hours; and consequently the *luna prima* from April 29 at midnight or April 28 at 18 hours.

The particulars of this calculation will be found in the Appendix to the last volume of this work; in which we have collected together almost all the calculations of this kind,

which we have had occasion to institute. It is sufficient for our purpose at present to state the result; that the true date of the new moon of April, B. C. 973, for the meridian in question, appears to have been April 29 at 5h. 1m. 30 sec. mean time, or, as nearly as possible, April 29 at 6 A. M. This calculation therefore brings a remarkable coincidence to light; viz. that the new moon of April, B. C. 973, at the epoch of the new succession of cycles of 25 years under the name of the Apis, and the new moon of April, B. C. 4004, at the epoch of the original succession of the same kind, were nearly the same in point of date; the latter having fallen out April 28 about noon, and the former falling out April 29 about 6 A. M. There is no reason to suppose that this coincidence also might not be recognised at this time, and have its weight. It is proper to mention too that the Dominical Letters B. C. 973 being E D, the hebdomadal character of this year within one feria was the same with that of the year of creation, when the hebdomadal character was C. April 28, B.C. 4004, was consequently the feria 4ª, and April 29, B. C. 973, was the feria 4ª also; May 1, B. C. 4004 was the feria septima, B. C. 973 it was the feria sexta.

Another coincidence which this calculation also brings to light is this: That the date of the mean new moon of April, B. C. 973, was as nearly as possible twelve hours earlier than that of the true; and the latter being April 29 about 6 A. M. the former was April 28 at 18 hours, or nearly so. For the calculation shews the date of the mean conjunction, for the meridian of Greenwich,

		h.	m.	sec.
	April 28	15	20	20
Meridians	+	2	5	3
For the meridian of Memphis	April 28	17	25	23

And this is so near to April 28 at 18 hours that it may be assumed as the same with it.

Now April 28 at 18 hours was the date of Thoth 9 æra cyc. 3034, according to the primitive rule; and consequently April 30 at 18 hours was the date of Thoth 11 according to the same rule: that is, the proper date of the first Apis cycle itself, according to the primitive rule, and the third lunar

period of 24 hours of mean time from the date of the mean conjunction, April 28 at 18 hours, were almost absolutely one and the same. It is probable that this coincidence, relating to the mean new moon, would be more regarded than the other, which concerned the true. For cyclical or calendar lunar time must be regulated perpetually by the mean new moon, not by the true; and both by the period of 24 hours of mean time. And in such a cycle or calendar as the Apis this period itself must be dated perpetually from sunset, or 18 hours after midnight. Nothing therefore would appear more necessary, or more desirable, than that the lunar reckoning of such a cycle should bear date from the mean new moon; and the mean new moon at 18 hours from midnight: and this being one of the coincidences which actually distinguished the epoch of the Apis cycle, it must be admitted that the time selected by the Egyptians for the correction of the cycle of 25 years, by the substitution of this cycle of Apis in its stead, May 1 B. C. 973, was singularly well chosen. And having this datum furnished from which to set out, (viz. that the proper epoch of this new succession of cycles, in the constant reckoning of calendar lunar time as the same with mean by the period of 24 hours whether of mean or of apparent time, was the third such mean lunar period, April 30 at 18 hours, B. C. 973, Thoth 11 at 18 hours, æra cyc. 3034,) we might easily adjust the details of the first Apis cycle agreeably to those conclusions which we have established in the present Dissertation, and in our former Dissertation on this subject: and one such cycle, so adjusted and distributed, would serve as a type of all the rest. But we do not consider it necessary to do this. We feel that we have dwelt on these topics sufficiently long; and that we must now hasten to make an end of them.

ii. In Ælian's account of the ceremonies consequent on the first discovery and recognition of the Apis[m], an observation occurred from which it was to be collected that this manifestation of the new Apis, (these Theophania as he called

[m] Vol. ii. 478. Diss. xiii. ch. i. sect. ii.

it,) was the stated date of the rise of the Nile also, τοῦ νέου ὕδατος. In the nature of things indeed there could be no connection, except *per accidens,* between the dates of two such different things as these, the birth and recognition of the Apis, and the rise of the Nile; the latter confined to the summer solstice or season of midsummer perpetually, the former attached to stated dates in the Apis calendar, but those dates necessarily cyclical, and incapable of being restricted to one season of the natural year more than to another. Yet *per accidens,* as we have observed, such a connection was possible. A given cyclical date must coincide with every season of the natural year in its turn: and it might happen *de facto* that the manifestation of the Apis, and the rise of the Nile, in a particular instance were coincident. But of all the cases of this kind, it is evident, the most striking and most memorable would be that of some such coincidence between the first manifestation of the Apis itself which could ever have taken place, and this natural phenomenon, so interesting to the Egyptians; that is, in the very first instance of all, at the rise of the fable of the Apis, and at the institution of the cycle, and at the introduction of the worship of the Apis itself. If that can be shewn to have been the case, then even the tradition, which appears in Ælian, would have some foundation in the truth of the fact, and might be handed down to posterity accordingly.

The mean vernal equinox, for the meridian of our tables, B. C. 973, bore date April 1 at 6 h. 14 m. 2 s. 24 th.: and consequently the true summer solstice July 2*. The proper Mazzaroth date of the summer solstice at this time was July 5, the cardinal points being still supposed to fall in the 12th degrees: but in this particular year, B. C. 973, which

			h.	m.	s.
* Mean vernal equinox at Jerusalem, B. C. 973	April	1	6	14	2.4
			−	15	44
At Heliopolis	April	1	5	58	18.4
One quarter		91	7	27	12·6
Mean summer solstice	July	1	13	25	31·0
Equation of the centre	+	1	2	45	53·3
True summer solstice	July	2	16	11	24·3

was leap-year in the Julian cycle of leap-year, and the third year after leap-year in the Mazzaroth cycle of that kind, *per accidens* it would be one day earlier, July 4. Now the date of the birth of the Apis being Athyr 10, and that of his recognition Athyr 11; these two dates, in the first instance of all, æra cyc. 3034, fell on June 29 and June 30 respectively; that is, the latter only two days before the true date of the summer solstice, and only four days before the Mazzaroth date. The stated date of the rise of the Nile then being always the summer solstice; it is manifest that these first Theophania, as Ælian styled them, and that physical phenomenon, the most important and interesting to the Egyptians in a national point of view of any which could happen, would very nearly coincide. And the former in reality having preceded the latter, we must form a very mistaken opinion of the cunning and foresight of the priests of Egypt, did we conceive it likely that they would neglect to take advantage of this coincidence, in order to make the people believe that the first manifestation of Osiris, in his new character and relation of the Apis, was purposely taking place at this season of the year, as a presage and prelude of this natural phenomenon, the greatest of national blessings to Egypt; as a pledge and a guarantee that it should take place both then and ever after at its proper season, through the good-will and instrumentality of Osiris himself, thus signally displayed in his condescending to live perpetually among them, in one city, Memphis, and in the person and under the form of the Apis.

It appears to us too that we possess in this coincidence of the manifestation of the first Apis at the stated time of the annual rise of the Nile the best explanation of the name of the Apis itself; concerning which we have met with nothing satisfactory in the books on hieroglyphics. It seems to be agreed however that the Egyptian name of the Apis was Hapi [n], and that this name was common to the Nile; only that the Nile was called Hapi-Mooü or Mu, the Apis simply

[n] Egyptian Antiquities, Part i. 52, 53. Cf. 25, 26. Wilkinson, Second series, i. xiii. 350. Bunsen, B. i. sect. vi. C: 431, 432. Cf. p. 401.

Hapi. According to Horapollo[o], the Egyptian name of the Nile was Νοῦν, which his translator explains to mean Νέον. In the chevalier Bunsen's vocabulary of Egyptian terms, we find both *nm* and *nn* and *nu*[p]; the former rendered by "water," the latter by "abyss of waters:" but the Coptic for each of these terms is the same, viz. *νοῦν*, the very word which occurs in Horapollo for the Nile. This being the case, we may very well doubt of the truth of the gloss of his translator, that *νοῦν* meant *new* (*νέον* in Greek); unless there was some other element compounded with it in the name of the Nile, which meant *new*, as *νοῦν* might mean water. The Egyptian for "water," in the same vocabulary, is *muau*[q]; in the Coptic *moo-ou*: and that the ancient Egyptian term for water was really something of that kind appears from the name of Moses; which in Greek was most correctly expressed by Μωϋσῆς, and yet was given him because of the fact of his being taken out of the water: Τὸ γὰρ ὕδωρ μως ὀνομάζουσιν Αἰγύπτιοι[r]—Τὸ γὰρ ὕδωρ μῶ οἱ Αἰγύπτιοι καλοῦσιν, ὑσῆς δὲ τοὺς ἐξ ὕδατος σωθέντας[s]—Τὸ δ' ἀληθὲς ὄνομα δηλοῖ τὸν ἐκ τοῦ ὕδατος σωθέντα Μωϋσῆν· τὸ γὰρ ὕδωρ Αἰγύπτιοι μῶϋ καλοῦσιν[ss]. In the chevalier Bunsen's Vocabulary too we find *Hap* in the sense of "to conceal[t];" and the authority, specified for that sense, is the name of the Nile, *Hapi Mui* itself; so that, on this principle, the proper meaning of that name must have been the "concealed water:" a name which might evidently be given to the Nile, the waters of which were every year renewed in so mysterious and inexplicable a manner.

Now, as the name of the Nile must have been much older in Egypt than the Apis, it would be contrary to all probability to suppose the Nile called Hapi after the Apis, and not the Apis called Hapi after the Nile: and that being the case, if Hapi denoted concealment of some kind, when predicated of the Nile, it must mean the same thing in general as applied to the Apis. But concealment of what, it may be asked? and with reference to what subject? In all probability, we

o i. 21.
p i. p. 472, No. 334, and 336.
q i. p. 471, No. 313.
r Philo-Jud. ii. 83. 21. De Mose, i.
s Josephus, ii. ix. 6.
ss Contra Apion, i. 31.
t i. 462, No. 162. See also, p. 503. Ideograph. No. 100. Hapi-mri (Hapi-mui?) "Concealer of the waters." "Nile."

reply, to Osiris: the true Hapi, disguised and concealed externally in the form of the Apis *. Hapi however being first and properly to be predicated of the Nile, we question whether the name would have been transferred to Osiris even in this sense, if his first manifestation in the person of the Apis had not happened to confine so closely on the stated phenomenon of the rise of the Nile. This agreement of name and of nature between the Nile and the Apis, or that of which the Apis was the type, was probably the reason why it was appointed to be kept in the first instance at Nilopolis, the city of the Nile; which in the Egyptian would be expressed by the city of Hapi: and probably also was ultimately the origin of the ceremony of the phial, and of the libation to the Nile, on the last day of the natales Apidis, of which we have given an account elsewhere [u].

Again: There was an interval, as we have seen, of 124 days, between the recognition of the Apis in the first year of every new cycle and the first natales: the reason of which, if discoverable at all, may most probably be so from the state of the case in the first instance of all likewise. In this first instance, as we have seen, the date of the recognition was Athyr 11, June 30: the date of the natales was Phamenoth 15, November 1. The date of the summer solstice in the sphere of Mazzaroth, B. C. 973, as we have also seen, was July 4: and this being just four days later than June 30, it is manifest that 120 days from July 4, and 124 from June 30, would both bring us to November 1 alike.

This term of 120 days was the stated measure of any one of the three seasons of the Egyptians, and consequently of the season of the waters. It is an obvious conjecture then, that the natales Apidis, in the original scheme and digest of the cycle, were fixed to the 125th day from the date of the recognition, Athyr 11, in order that they might coincide with the close of the season of the waters, dated from the solstice of Mazzaroth, July 4 or 5. The close of this season, it should be remembered, was the beginning of the next, the season of

* According to Wilkinson, quoted by Bunsen, (i. p. 431,) *Api-Hesyri* occurs on an hieroglyphical inscription; i. e. Hapi-Osiris or Hapi-Hysiri. What would that be but Osiris the concealed?

u Vol. ii. 544. Diss. xiii. ch. iv. sect. i.

ploughing and seed-time and vegetation: and in this first instance of all, when Phamenoth 15 was falling on Nov. 1, just one month later than the autumnal equinox, Oct. 2 *, the first natales Apidis, celebrated on Phamenoth 15, could have ushered in nothing with more propriety than this season itself. Nor was Osiris so properly the type of any thing as of the principle of vegetable life.

iii. It is a natural subject of inquiry, with reference to which we have yet said nothing expressly, in what manner the principal dates in the Apis ritual, which must have been first laid down in the first type of the cycle, and must have been first accommodated to that, would be affected by the subsequent changes and modifications of this type; of which we have discovered two: one, Nab. 225 B. C. 523, in substituting which for the original type the Egyptians were not free agents; and another, Nab. 442–443 B. C. 306, in the adoption of which they acted of their own accord.

In our opinion, in neither of these cases could the Egyptians have any alternative except that of modifying and changing these dates too: which nevertheless was very easily to be done. The epoch of the cycle dropt 11 days in one of these instances, and 5 days in the other: so that these dates would be 11 days lower in the second type than in the first; and 5 days lower in the third type than in the second.

Cardinal dates of the Apis cycle.

	Type i.	Type ii.	Type iii.
Conception ..	Full moon, Mecheir 4.	Full moon, Tybi 23.	Full moon, Tybi 18.
Birth........	New moon, Athyr 10.	New moon, Phaophi 29.	New moon, Phaophi 24.
Natales......	First dichotomy, Phamenoth 15.	First dichotomy, Phamenoth 4.	First dichotomy, Mecheir 29.
Death	New moon, Pachon 18.†	New moon, Pachon 7.	New moon, Pachon 2.

Of the actual fact of these changes we have already pro-

		h.	m.	s.
* Mean V. E. at Heliopolis, B. C. 973 ..	April 1,	5	58	18·4
Two quarters	182	14	54	25·2
Mean A. E.	Sept. 30,	20	52	43·6
Equation of the centre	+ 1	11	4	46·2
True A. E.	Oct. 2,	7	57	29·8

† We have added this date in each of these types here; but the reason of it will appear only in the next chapter.

duced something like proof, in the date of the natales celebrated at Memphis A. D. 71[w], in which Titus Cæsar acted a conspicuous part: for we have determined the date of that ceremony with great probability to January 31, which actually coincided in that year with Mecheir 29. If so, these natales in particular must have been celebrated according to that modification of the original rule of type i, which we have supposed to characterise type iii. We shall probably see another and a still more critical proof of the same thing in general in the next chapter.

iv. We believe that we have now ascertained and fixed every date of importance in the Apis cycle, except one; that of the disappearance of the Apis at the end of its proper cycle, analogous to the stated date of its appearance at the beginning. There is every reason to suppose there was always such a date in every cycle; but we cannot investigate or fix it without instituting a preliminary inquiry into the history of the Egyptian Sarapis: which we propose to do in the following chapter. We shall conclude this present chapter with the illustration and verification of the Egyptian tradition relative to the coincidence of Athyr 17, the date of the first Isia, æra cyc. 2657, with the lunar fourteenth[x]; by means of the primitive cycle of 25 years.

For this purpose we must refer to the xxvth type, proposed supra[y]; in which the epoch was Thoth 8 = luna 29: and consequently the luna prima was Thoth 10, the last lunar month in the cycle being assumed to be one of 30 days.

Æra cyclica 2656–2657 answered to cycle cvi. 7. In this year of type i, the epoch was Epiphi 9: and as adapted to type xxv it would be two numbers higher, Epiphi 11. Hence

		Days.			
i	Month	30	Epiphi	11	Æra Cyc. 2656.
ii	—	29	Mesore	11	
iii	—	30	Thoth	5	Æra Cyc. 2657.
iv	—	29	Phaophi	5	
v	—	30	Athyr	4	
			—	17	Luna 14a.

w Vol. ii. 593. Diss. xiii. ch. vi. sect. xiii. x Vol. iii. 158. Diss. xiv. ch. v. sect. ii. y Page 383.

CHAPTER III.

On the Sarapis of the Alexandrine Greeks; and on the date of the introduction of the worship of Sarapis into Egypt.

SECTION I.—*Connection of this subject with the Apis cycle.*

We propose to conclude our account of the Apis and of the Apis cycle with an inquiry into the history of the Sarapis of the Alexandrine Greeks; into the time and the circumstances of the first introduction of this god also into Egypt; and into the date to which the Sarapea in that country were originally attached: not only because this question itself is curious and interesting, as well as obscure, (on which little or no light has yet been cast;) but also because (if we are not greatly mistaken) it is closely connected with the proper subject of this Dissertation itself, and will probably lead to a discovery which never could be made in any other way, and yet is necessary, in order to supply an important omission in the account of the Apis cycle itself; that of the stated date of the death of the Apis at the end of its proper cycle.

The chain of reasoning indeed, by means of which this discovery will have to be made, will be found to consist of various links, and the discovery itself to be the result of many concurrent circumstances, conspiring to that one effect; rather than of direct and positive testimony to the fact itself: which is no where extant. But circumstantial evidence, wheresoever it thus conspires and concurs to one and the same result, is just as satisfactory as direct and positive testimony. The various links of our chain, we trust, will be found to hang together, and one to support another. Without further preface or apology then we shall proceed at once to the exposition of these proofs.

SECTION II.—*On the Pelosia of the Roman calendar.*

We begin with the production of the following passage from Lydus, De Mensibus[z]:

Πρὸ δεκατεσσάρων καλανδῶν Ἀπριλίων ἑορτὴ παρὰ Ῥωμαίοις τιμωμένη, οὐχ ὡς Ῥωμαϊκὴ ἀλλ' ὡς μεγίστην παρ' Αἰγυπτίοις ἔχουσα τιμὴν, δι' αἰτίαν τοιαύτην. τοῦ Νείλου τὴν ἐτήσιον ἐπίδοσιν τῶν ὑδάτων ἀρνουμένου ποτὲ, καὶ ταύτῃ τῶν Αἰγυπτίων ἀπολλυμένων, δαίμων τις ἀγαθὸς εἰς ἄνθρωπον φανεὶς ὅλον τὸ σῶμα πεπηλωμένος ἐξεβόα τοῖς Αἰγυπτίοις· Ἀναβλύσαι τὸν Νεῖλον, καὶ αὐτὸς ἐμπεσεῖν τοῖς ὕδασιν· τῶν δὲ ἀπιστησάντων ἔργῳ δὲ τἀληθὲς εὑρόντων, ἑορτὴ παρ' αὐτοῖς τε καὶ παρὰ τοῖς Ἕλλησιν ὡρίσθη λεγομένη Πηλούσιος (corrige Πηλώσιος.)

We shall observe on this statement at present only that it must clearly be collected from it that there was once a festival in the Roman calendar, attached, according to this testimony, to xiv Kalendas Apriles, March 19 Roman; yet not of Roman but of Egyptian origin: a festival borrowed from the Egyptians, and, as it would seem, from the Egyptian Greeks; a festival traditionally connected with the rise of the Nile, or the phenomenon of the inundation, and with the appearance of some superhuman being in the form of a man, whose body was besmeared all over with the mud or slime which the inundation annually deposited on the surface of the country, or with some substance in appearance resembling that. And this mud or this substance being expressed by πηλὸς in Greek, the name of this festival, according to the analogy of all such names in Greek, was Πηλώσια—i. e. the mud-festival; though the reading of the text of Lydus at present has Πηλούσιος, instead of Πηλώσιος; which we do not hesitate to pronounce a corruption of the true reading, Πηλώσιος, (sc. ἑορτή.)

Secondly, we refer to the following passage in Capitolinus' Life of the Emperor Marcus Aurelius[a]: Sacra Serapidis a vulgaritate Pelusiæ submovit. In this instance too the reading in all the editions, except the editio princeps, is Pelusiæ: but in the editio princeps it is Pelosiæ. Nor can we doubt that the true reading is Pelosiæ. The editors of the Historiæ

z iv. 40. p. 75. l. 3.

a Cap. 23. Historiæ Augustæ SS.

Augustæ Scriptores, without exception as far as we know, have mistaken the meaning of this statement; which has led them to substitute the false reading of Pelusiæ for the true and original one of Pelosiæ. But it has nothing to do either with Pelusium or with the Pelusiotæ. The best explanation of it is the passage just produced from Lydus; from which we have learnt the fact of the existence of an ἑορτὴ πηλώσιος in the Roman calendar, Πηλώσια in Greek, and Pelosia in Latin; the characteristic distinction of which must have been, that those who celebrated it besmeared their bodies, for the occasion, all over with mud. We now learn from this testimony of Capitolinus, that this ceremony, in the Roman observance of it also, and in the Roman calendar, was originally connected with the worship of Serapis; that the Roman Serapea and the Roman Pelosia at first were coincident; each being celebrated at the same time, and each in the same way: but this being a low and burlesque and objectionable way of doing honour to such a divinity as Serapis, the emperor Marcus Aurelius, from his own sense of propriety, separated the Serapea from the Pelosia; transferring the former to a different month and a different day in the calendar, (of which something will be said hereafter,) and leaving the latter attached to the same month and to the same day as before.

This is the true meaning of the statement, Sacra Serapidis a vulgaritate Pelosiæ submovit: that is, he separated the Serapea from any longer communion or contact with the Pelosia, from any longer celebration promiscuously and in common with the Pelosia: from the *vulgarity* of the Pelosia, not in the opposite sense to that of refinement or gentility, such as we mean by the word vulgarity ourselves, but in its simple vernacular sense of *commonness:* the way in which it was commonly and vulgarly celebrated.

It seems then that the Roman Pelosia were the same with the Roman Serapea, until this distinction between them was made by Marcus Aurelius. And this is an important conclusion. No one requires to be told that the Roman Serapis must have been ultimately the Egyptian: and as we have learnt from Lydus that the Roman Pelosia were derived from the Egyptian; if the Roman Pelosia were connected from

the first with the Roman Serapea, we may justly infer that the Egyptian Pelosia also must have been originally connected with the Egyptian Sarapea: in which case too we could not hesitate to conclude that the *δαίμων ἀγαθὸς*, to whose appearance in the manner and under the form above described, the institution of the Egyptian Pelosia itself was traditionally ascribed, must have been Sarapis.

In the third place, we find in the Constantian calendar, to which we have often had occasion to refer, opposite to the xiii kal. Apriles, or March 20 Roman, the entry of "Pelosia;" which every one must recognise as the *ἑορτὴ πηλώσιος* of Lydus, and as the Pelosia of Capitolinus. It is attached in this calendar indeed to March 20 Roman; in Lydus De Mensibus to March 19 Roman: but the difference between these dates amounts only to one day, and it may be safely inferred from both testimonies in conjunction that the true date was either March 20 Roman or March 19. Between these two days, we do not hesitate to decide in favour of March 20, because the Constantian calendar, which assigns this date, is not only a more perfect and complete monument of its kind than this work of Lydus De Mensibus; but because it is 200 years older than Lydus' work De Mensibus; and it is more to be trusted for the true Roman date of this ceremony in the times anterior to its own than Lydus. The 19th of March in Lydus is the date of the Quinquatria also, which must thus have coincided with his Pelosia; but in the Constantian calendar the Quinquatria have the 19th of March, the Pelosia the 20th: so that in that they are kept distinct. The true date of the Roman Pelosia therefore, in the time of this calendar, and as we may reasonably suppose at first, must have been March 20 Roman, whatsoever it might be in Lydus' time; if it was really still kept up in his time. And as it appeared from Capitolinus that the emperor Marcus shifted the Serapea to some other date, leaving the Pelosia in possession of its proper date as before; so in this Constantian calendar too, opposite to vii kal. Maias, April 25 Roman, we find the name of "Serapis:" implying that the Sacrum Serapidis was now attached to that date. And this is confirmed by the testimony of the

Kalendarium Rusticum of the Romans[b]; in which the Serapea are specified by name as one of the ceremonies which were in course in the latter half of the month of April.

Again, it admits of being shewn, that in the time of Apuleius, and at the supposed date of his Milesian Fables, the Serapea were already attached to the month of March, and to some day in that month which must have coincided as nearly as possible with March 20: and if the opportunity should ever arrive of discussing the question of the date of this work of Apuleius, in connection with another branch of our own subject, we may possibly enter upon the particulars of that proof. The true date of this work is determined by evidence of a very critical nature to A. D. 140 and 141: and from this fact, combined with the other of the original conjunction of the Serapea and the Pelosia in the Roman calendar, and both on the same day March 20, we might infer that both had been already consigned to the calendar, and both to this day in the calendar, before A. D. 140 at least.

SECTION III.—*On the probable date of the adoption of the Pelosia in the Roman calendar; and on the Egyptian date from which that of the Pelosia was taken.*

There are many dates discoverable after a time even in the Roman calendar, which upon investigation are found to have been borrowed from the Egyptian; and with respect to which, and the circumstances under which they were transferred from their proper calendar to the Roman, one and the same rule appears to have held good: viz. that whatsoever might be the state of the Roman calendar itself at the time, and whatsoever its relation to the Julian properly so called, the Roman date, under which the Egyptian was consigned to the Roman calendar, was always that with which the Egyptian was coinciding at the time. These dates are consequently extremely valuable; being the surest tests and criterions of the actual relation of the Roman to the Julian calendar, at such times also, to which we could appeal. For though the Roman calendar, for a long time after the cor-

b Gruter, cxxxviii. cxxxix.

rection of Julius Cæsar, never continued to preserve the same relation to the Julian perpetually, the Egyptian always did so; and there are no better means of judging of the relation of the proper Roman to the proper Julian calendar at particular points of time, while the former was still subject to the same liability to change and variation, than the knowledge of its relation to the Egyptian at the same points of time also. It follows too from the same fact that, if the year in which a particular date of this description was consigned to the Roman calendar is known, or can be reasonably conjectured; the Roman date, under which it was so consigned, may be made instrumental to the discovery of the Egyptian with which it was coinciding at the time.

We propose to apply this criterion of the Roman date of the Pelosia, March 20, to the Egyptian, from which that must have been taken. And having already ascertained that the introduction of this date into the calendar must have been earlier than A. D. 140, the first or second year of Antoninus Pius at least; all that we will assume at present, preliminary to the application of the test in question, is that it might be and very probably it was actually consigned to the calendar in the reign of Adrian.

The emperor Adrian is known to have visited all parts of the empire in person; and amongst the rest Egypt: and we had occasion to shew in our own Dissertations[c] that his visit to Egypt in particular must have been going on in the *eleventh* year of his reign, A. D. 127–128. Let us therefore compare together the Roman and the Egyptian calendar, both in A. D. 127–128, and for four years afterwards, down to A. D. 131–132.

At this period in the history of the administration of the Julian correction at Rome, the relation of the Roman calendar to the Julian was one of equality: a given date in the former answered to the same in the latter in *terms*. But this relation did not exist longer than the reign of Adrian. It had in fact become a relation of inequality even before the close of the reign of Adrian; and it was one of inequality at the beginning of that of Antoninus Pius.

c Dissertations, App. Diss. xviii. vol. iv. 103 sq.

It will be seen from our general tables that Thoth 1 dated from midnight Nab. 875 corresponded to July 23 at midnight A. D. 127. Hence, the scheme of the Egyptian year, Nab. 875, in terms of the Julian, A. D. 127–128.

Nabon. 875, A. D. 127–128.

		A. D.			A. D.
Thoth	July 23	127	Phamenoth	Jan. 19	128
Phaophi	Aug. 22	—	Pharmuthi	Feb. 18	—
Athyr	Sept. 21	—	Pachon	Mar. 19	—
Chœac	Oct. 21	—	Paüni	April 18	—
Tybi	Nov. 20	—	Epiphi	May 18	—
Mecheir	Dec 20	—	Mesore	June 17	—

Epagomenæ July 17.

A. D. 128 being leap-year, Thoth 1 Nab. 876 would be found to have dropt from July 23 to July 22 A. D. 128: and every date, in the above scheme, from Thoth 1 July 23 to Pharmuthi 1 Feb. 18 in Nab. 875, would be seen to have fallen one day lower in Nab. 876. But the dates from Pachon 1 March 19 A. D. 128 would continue the same down to A. D. 131 Nab. 879. It follows that, in every year of the interval from A. D. 127 to A. D. 131, Nab. 875 to 879, within which Adrian was certainly in Egypt; March 19 Roman would answer to Pachon 1, and March 20 to Pachon 2: and *vice versa*. And could it only be assumed with certainty that the Pelosia were taken from the Egyptian, and transferred to the Roman, calendar in any year of this interval; it would follow with certainty also that, as the Roman date of the Pelosia was March 20, the Egyptian must have been Pachon 2. And though we cannot take this assumption for granted at present, we have done much already to render it probable: in particular by having shewn that the Roman Pelosia had already been attached to March 20 before A. D. 140.

SECTION IV.—*On the date of the introduction of the worship of Sarapis into Egypt.*

We must now proceed to investigate the date of the actual introduction of the worship of Sarapis into Egypt. For that

purpose we have thought it necessary to collect the testimonies of antiquity; though for the sake of brevity, and because of the great length to which our work has already extended; we beg to be excused from giving them in terms and in detail[d].

From the comparison of these several accounts it must be inferred i. That Sarapis, under that name at least, was not a native Egyptian deity, but introduced from abroad. According to Tacitus indeed Sarapis was always an object of worship at Memphis, or, (in conjunction with Isis,) on the same spot where his temple itself was afterwards erected. But this is easily explained; if he was from the first identified with Osiris, or from the first connected with the Apis: the former necessarily associated with Isis, the latter with Memphis. It may be taken for granted, notwithstanding this seeming traditional testimony of Tacitus to the contrary, that Sarapis, under that name at least, before the time of the Ptolemies had not yet been heard of in Egypt.

ii. That Sarapis was introduced into Egypt, nominally at least, from Sinope on the Pontus. Seleucia indeed in Syria is mentioned by Tacitus as the quarter from which he was said to have come according to one account, which it appears from Clemens Alexandrinus was that of Isidore, (of Charax:) and this Seleucia, according to the same authority, Seleucia on the Orontes, or near to Antioch. But there can be no reasonable doubt that the image, represented as that of Sarapis, and specified as the κολοσσὸς, in the form of which he was first brought to Egypt, came from Sinope on the Pontus Euxinus: though why it was fetched from that quarter, and in what particular manner it was procured, those are different questions, upon which it does not appear to us that we have any occasion to enter at present.

iii. That Sarapis, and under that name, and in the shape of this colossal image, was first introduced into Egypt in the time of the Ptolemies. The accounts of antiquity indeed vary, or appear to vary, with respect to the particular Ptolemy;

[d] Plutarch, De Iside et Osiride, xxviii. Clemens Alexandrinus, Protrepticon, cap. iv. § 48. p. 41, 42. Tacitus, Historiæ, iv. 83, 84. Eustathius, ad Dionysium Perieg. ver. 254. Origen, Contra Celsum, v. 37, 38: Opp. i. 606. B. 607. B. 608. A.

whether the first of that name, or the second, or the third. We say however, they *appear* to vary; for this difference turns out to be after all more seeming than real.

With respect to the third Ptolemy, commonly known by the name of Euergetes I, the grandson of Ptolemy Lagi; the introduction of Sarapis into Egypt in his reign rests on the same authority as that of the importation of his statue from Seleucia on the Orontes, not from Sinope on the Pontus. We cannot hesitate therefore to set this aside. Plutarch and Tacitus both date it in the reign of the first Ptolemy, Ptolemy Soter or Lagi; Clemens Alexandrinus in that of the second, Ptolemy Philadelphus: and this is a difference more seeming than real, as will appear by and by; though in any case, and with respect to such a question of fact as this of the history of the principal divinity of his own city and in his own time, the authority of Clemens Alexandrinus would be preferable to that of Plutarch or of Tacitus. Not to mention that, whereas Plutarch descends into no particulars concerning the mode in which the statue of Sarapis came into the possession of *his* Ptolemy, and Tacitus' account is full of incredible circumstances; Clemens assigns a rational and probable explanation of the fact, by telling us that Ptolemy Philadelphus having relieved the people of Sinope in a time of scarcity by a seasonable yet gratuitous supply of corn, they sent him the statue as a present in token of their gratitude, and as an acknowledgment of the obligation under which he had laid them: and in our opinion, had the truth been more plainly handed down to us on this point, it would have been found that this was in reality *after* not *before* the first introduction of the worship of Sarapis itself into Alexandria.

On this particular question however, connected with the history of Sarapis, the difference of testimonies may be more seeming than real. Even if the first idea of the introduction of his worship into Egypt was conceived by the first Ptolemy, it must have been towards the end of his reign; and as it took up three years, according to Tacitus, to accomplish his object, and the second Ptolemy was associated with his father two years before the end of his reign; it must always have been an obvious mode of reconciling these different accounts, to suppose that the design was conceived and the first steps

towards its execution were taken in the reign of the first Ptolemy; but that it was completed only in that of the second. When however we read in Pausanias' description of Athens[e]: *'Εντεῦθεν ἰοῦσιν ἐς τὰ κάτω τῆς πόλεως Σαράπιδός ἐστιν ἱερὸν, ὃν 'Αθηναῖοι παρὰ Πτολεμαίου θεὸν εἰσηγάγοντο*: we can have little doubt that none of the Ptolemies could have had so close a connection with Sarapis, or have taken so much interest in the recognition of his divinity by the rest of the Greeks, as the second Ptolemy, of whom Pausanias is here speaking. For it was no doubt in order to flatter this Ptolemy, and to pay their court to his prejudices, and his partiality in favour of Sarapis, that the Athenians expressly introduced him into their own city, as the words of Pausanias imply that they did; yet as an object of worship for which they had applied to, and which they had obtained from, Ptolemy Philadelphus himself. If it was from this Ptolemy that the Athenians learnt to acknowledge the divinity of Sarapis, which of the Ptolemies was more likely to have introduced him into Egypt itself than he? Accordingly in the Armenian Chronicon of Eusebius the introduction of this god from Sinope on the Pontus into Egypt is actually ascribed to Ptolemy Philadelphus, not to Ptolemy Soter[f]. We conclude then that, whether Ptolemy Soter had any connection with the same event or not; the actual introduction of Sarapis into Egypt was one of the incidents of the reign of Ptolemy Philadelphus.

The precise year of this event also is assigned by Eusebius[f] in three different reckonings; in 1738 or 1739 of the æra of Abraham, Olymp. cxxv. 3 or 4 of the æra of the Olympiads, and the 6th or 7th year of the reign of Ptolemy Philadelphus itself[g]: and all these dates are such as might very nearly meet in the same year. But the details of the Armenian version of this Chronicon cannot always be depended on for one year, or even for two: and when we consider that the reign of Philadelphus began in strictness two years before his father's death[h], and that tradition connected the introduction of the worship of Sarapis with the reign of his father as well

[e] i. xviii. 4: cf. vi. 8: vii: viii. 6.

[f] Pars ii. 231. Ad ann. 1758.

[g] Cf. Cyrill, Contra Julianum, i. 13. C D. Jerome, Chronicon, ad ann. 1730.

[h] Chronicon Arm. Lat. pars i. 237. Justin, xvi. ii. § 7. Pausanias, i. vi. § 8. Diogenes Laertius, Demetrius Phal. lib. v. cap. v. sect. viii. § 78. Lucian, Macrobii, 12. Opp. iii. 216.

as his own; it will not appear improbable that the actual date of the introduction might be the fifth or sixth year from the association of Philadelphus with his father. And this being dated B. C. 286[i]; it would give the date of the introduction B. C. 281 or 280: a conclusion which as we shall see by and by is actually in agreement with the truth. It must be admitted however that this is a point which the testimonies already produced do not appear competent to decide, except within certain limits. We must proceed therefore to consider whether something may not yet be adduced, which will enable us to determine the date of the event, on a different principle.

SECTION V.—*On the coincidence of the first introduction of the worship of Sarapis into Egypt with the close of an Apis cycle.*

It cannot be denied that statements are extant which connect the Sarapis of the Egyptians in a peculiar manner with the death of the Apis. In the first place, it is a common explanation of the name of Sarapis itself, to derive it from *σορὸς* and Ἆπις, as if it were *Σόραπις* or *Σορόαπις*[j]. In the Chronicon of Eusebius, opposite to the year to which we have referred, the entry is Sarapis Alexandriam venit, qui et Sorapis vel etiam Sirapis secundum quosdam; et illic habitavit[k]: where Sirapis is evidently the name of Osiris compounded with Apis; which in the Greek form would be Ὀσίραπις, and the *ο* being mistaken for the article, *Σίραπις*. The name of Osiris is found on the monuments thus compounded both with the name of the Apis and with that of the Mneuis[l]. Νυμφόδωρος δὲ ὁ Ἀμφιπολίτης ἐν τρίτῳ νομίμων Ἀσίας (φησὶ) τὸν Ἆπιν τὸν ταῦρον τελευτήσαντα καὶ ταριχευθέντα εἰς σορὸν ἀποτίθεσθαι τῷ ναῷ τοῦ τιμωμένου δαίμονος· κἀντεῦθεν Σορόαπιν κληθῆναι καὶ Σάραπιν συνηθείᾳ τινὶ τῶν ἐγχωρίων ὕστερον[m]. We do not refer to these definitions of the name, because we suppose them to be well-founded: for we are persuaded that

[i] Vol. ii. 430. Diss. xii. chap. iii. sect. i.

[j] Suidas, *Σάραπις*.

[k] Cf. Cyrillus, Contra Julian. lib. i. 13 D. Syncellus, i. 522. l. 17. Augustin, De Civitate Dei, xviii. 5. Varro, Fragmenta, p. 230. Isidore, Origines, viii. 11. 171. H.

[l] Le Tronne, xxv. i. P. ii. 297.

[m] Clemens Alexandrinus, Strom. i. xxi. § 106. p. 75. l. 16. Cf. Eusebius, Præp. Evang. x. 12. § 25. p. 531.

the only proper form of the name from the first was Σάραπις or Sarapis. But what may we ask could give occasion to any such explanations, except the fact that Sarapis and Osiris were after all the same person, and each alike related to the Apis; yet so that Osiris had a special relation to the living Apis, and Sarapis to the dead one?

Again, it appears from the sequel of that passage of Pausanias, to which we lately referred, that Sarapis had a temple at Memphis, the oldest of all which were sacred to him in Egypt: into which no one could enter, not even the priests, except when they were burying or preparing to bury the Apis: *Αἰγυπτίοις δὲ ἱερὰ Σαράπιδος ἐπιφανέστατον μέν ἐστιν Ἀλεξανδρεῦσιν, ἀρχαιότατον δὲ ἐν Μέμφει...ἐς τοῦτο ἐσελθεῖν οὔτε ξένοις ἐστὶν οὔτε τοῖς ἱερεῦσιν πρὶν ἂν τὸν Ἄπιν θάπτωσι.* On this passage we may remark first of all that, if Sarapis was unknown in Egypt, at least by that name, before the time of Ptolemy Philadelphus, this temple in Memphis never could have been dedicated to him under that name from the first. If Macrobius is to be believed[n], he had no temple, within the walls of any city in Egypt, much less in Memphis, under this name of Sarapis. On what principle then could this temple in Memphis have come to pass for the temple of Sarapis, and for his most ancient temple too? Simply because, as Pausanias gives us to understand, it was the burial-place of the Apis: in this temple the Apis had always been deposited after its death. No stranger, it seems, could enter this temple at any time; nor even the priests themselves except at one time; viz. when they were burying the Apis: *πρὶν ἂν τὸν Ἄπιν θάπτωσιν.* And here the form of the phrase itself is remarkable, *πρὶν ἂν θάπτωσιν*, not *πρὶν ἂν θάψωσιν*: "till they *are* burying," not "till they *have* buried the Apis."

We explain this, if Sarapis was as much connected with the dead Apis as Osiris was with the living one; if the dead Apis was the type of Sarapis as the living one was of Osiris. Moreover, if it so happened that the coming of Sarapis to Egypt coincided with one of these occasions of the death and burial of the Apis, when and when only this temple-vault, his proper cemetery, was wont to be opened and

n Saturnalia, i. vii. 228.

entered; this coincidence too would connect Sarapis, in his proper relation to the deceased Apis, with that temple in Memphis from the first: and so would justify the assertion of Pausanias that his oldest temple was in Memphis, though his most splendid and magnificent one was at Alexandria. It would justify Macrobius too in stating that Sarapis had no where a temple in any city of Egypt *intra muros*: for the Apis was buried no where in Egypt but at Memphis: and his cemetery there was quite as much a temple of the Apis as of Sarapis. The Sarapeum is no doubt the temple of Sarapis at Alexandria, to which Pausanias refers; and this is described by the ancients as one of the most magnificent structures of its kind any where in existence, and as one of the wonders of the world: yet even this was not situated strictly speaking in Alexandria, but on the *ἄκρα* or headland near it, according to Tacitus and Clemens Alexandrinus, called Rhacotis. Such a temple as that however could not have been erected in honour of Sarapis all at once; but with the temple at Memphis he must have been associated from the first, if he was connected with the dead Apis from the first; and in particular, if the actual time of his first coming to Egypt coincided with the close of an Apis cycle.

We may collect from Porphyry[n] that the services performed in the interior of this temple-vault, on these solemn occasions of the death of the Apis, were of a peculiar kind; in which nothing was permitted to be used but fire and water: *Ὥς που ἔτι καὶ νῦν ἐν τῇ ἀνοίξει τοῦ ἁγίου Σαράπιδος ἡ θεραπεία διὰ πυρὸς καὶ ὕδατος γίνεται, λείβοντος τοῦ ὑμνῳδοῦ τὸ ὕδωρ καὶ τὸ πῦρ φαίνοντος, ὁπηνίκα ἀνεστὼς ἐπὶ τοῦ οὐδοῦ τῇ πατρίᾳ τῶν Αἰγυπτίων φωνῇ ἐγείρει τὸν θεόν.* The same fact of the connection of Sarapis with the dead Apis may be inferred from Plutarch, as well as from Pausanias, and even more plainly from the former than from the latter; since he gives us to understand that on the strength of this connection some authorities, (whether Greeks or Egyptians he does not say, but no doubt Greeks,) had gone so far as to maintain that Sarapis himself was nothing more than the *σορὸς* of the Apis[o]: *Ἄτοπα γὰρ ταῦτα τοῦ Φυλάρχου, πολλῷ δ' ἀτοπώτερα τὰ*

[n] De Abstinentia, iv. 9. 324.
[o] De Iside et Osiride, xxix.: cf. Diodorus, i. 96.

τῶν λεγόντων οὐκ εἶναι θεὸν τὸν Σάραπιν, ἀλλὰ τὴν Ἄπιδος σορὸν οὕτως ὀνομάζεσθαι, καὶ χαλκᾶς τινας ἐν Μέμφει πύλας λήθης καὶ κωκυτοῦ προσαγορευομένας ὅταν θάπτωσι τὸν Ἆπιν ἀνοίγεσθαι, βαρὺ καὶ σκληρὸν ψοφούσας. He too no doubt means here the same locality in Memphis, which Pausanias did by the oldest temple of Sarapis; and he too describes it as nothing more than the stated burial place of the Apis; and he too as opened only on such occasions as those of the burial of the Apis: and he also uses the same form of words, to designate a process of interment merely going on or beginning and not yet complete: *ὅταν θάπτωσι τὸν Ἆπιν.* We may reasonably concur in the judgment of Plutarch, that to deny Sarapis an actual personal existence, to say he was nothing more than the abstract conception of the coffin of the Apis, was absurd; yet we cannot concur with him in supposing that there was no foundation even for such an opinion as that; or even for maintaining that there was no sensible token of the actual relation of Sarapis himself to the Apis, except the *σορὸς* or the mummy of the dead Apis.

Again, it may be collected from Plutarch that the best informed of the Greeks, (with whose opinion he evidently concurred himself,) considered Sarapis the same as Pluto; and Sarapis itself as only the Egyptian name of the Hellenic Pluto[p]: *Οὐ γὰρ ἐκεῖθεν οὕτως ὀνομαζόμενος ἧκεν* (that is, not from Sinope, under the name of Sarapis from the first,) *ἀλλ' εἰς Ἀλεξάνδρειαν κομισθεὶς τὸ παρ' Αἰγυπτίοις ὄνομα τοῦ Πλούτωνος ἐκτήσατο τὸν Σάραπιν*[q]: and he considers this name so exclusively Egyptian, that, while he refuses to give up the right of the Greek language as much as the Egyptian to the name of Osiris, he resigns that of Sarapis to this latter entirely: *Ἥκιστα μὲν οὖν δεῖ φιλοτιμεῖσθαι περὶ τῶν ὀνομάτων, ἀλλὰ μὴν μᾶλλον ὑφείμην τοῦ Σαράπιδος Αἰγυπτίοις ἢ τοῦ Ὀσίριδος*[r].

The truth is the Egyptians connected Osiris with the lower world, or region of souls, the Hades of the Greeks; as much as with the upper world. Plutarch tells us[s] they gave the name of Ἀμένθης to this lower world; the meaning of which, in the Egyptian, was *ὁ λαμβάνων καὶ διδοὺς*[t], the place of receiving and the place of giving, in the sense of restoring, too.

p De Iside et Osiride, xxvii. q xxviii. r lxi. s xxvii. t xxix.

Such a name associated it at once with their esoteric doctrine of the metempsychosis or transmigration of souls: according to which as often as the soul had fulfilled its proper term of service in one form and in one body it returned to this Amenthes, which was then the place of receiving; yet after a time, in order to enter on a new term of service in a new form and a new body, it came back from it again: and it was then the place of restoring or giving back. They made Osiris the lord of this Amenthes; especially after his supposed death. One of his styles, on the monuments, is that of the president and judge of this Amenthes, or Amenti[u]. And this conception of his character, and of his relation to the invisible as well as to the visible world, was doubtless older than the introduction of the worship of Sarapis; but Sarapis having once been introduced, and in a character corresponding from the first to that of the Hellenic Pluto, it is manifest that he must have been regarded in the light of the lord of the Amenthes too: and therefore so far as the same with Osiris; the Osiris of the lower world. And as the Osiris of the upper world had his proper type and representative in the living Apis, so had the Osiris of the lower world, that is Sarapis, *his*, in the person of the dead Apis; dead at least, in the sense of migrated to Amenthi: for death in the proper sense of the term was not compatible with the Egyptian doctrine of the metempsychosis; and the Apis being regarded as divine, they could not suppose it to be capable of dying any more than Osiris himself.

Lastly, it appears from Clemens Alexandrinus[w] that, according to Athenodorus, (ὁ Σάνδωνος[x],) the statue of Sarapis was as old as the time of Sesostris[y], and the work of an artist, employed by him to make it, called Bryaxis: who having cemented it in a curious manner with filings of various metals—gold, silver, brass, iron, lead, and tin—and with all sorts of precious stones, smeared and covered over the whole externally with jet (κυανῷ) and with the mixture of

u Wilkinson, Second series, i. xii. 212. Bunsen, B. i. sect. vi. C. App. 430–433. Egyptian Antiquities, Part i. page 15. 29, 30.

w Protrepticon, loco cit.

x See our Dissertations, Diss. xvii. vol. ii. 128, 129.

y On this notion perhaps might be founded Tertullian's, that Sarapis was the patriarch Joseph: v. 180, 181. Adv. Nation. ii. 8: or simply on the fact of Joseph's body having been put into a coffin in Egypt. Cf. Suidas, in Σάραπις.

drugs remaining from the embalment of Osiris himself, and of the Apis: *Τῷ ἐκ τῆς Ὀσίριδος καὶ τοῦ Ἄπιος κηδείας ὑπολελειμμένῳ φαρμάκῳ*: from which circumstance too he derives the name of Sarapis, as if compounded of Ὄσιρις and Ἆπις: *Οὗ καὶ τοὔνομα αἰνίττεται τὴν κοινωνίαν τῆς κηδείας, καὶ τὴν ἐκ τῆς ταφῆς δημιουργίαν, σύνθετον ἀπό τε Ὀσίριδος καὶ Ἄπιος γενόμενον, Ὀσίραπις.* What could be the meaning, and what the foundation, of such a fable as this, if the embalmed body of the Apis was not in some sense or other an emblem or type of Sarapis? if Sarapis was not a middle term, or common idea, between the Apis and Osiris? if Sarapis had not a specific relation to the dead Apis, as Osiris had to the living one? so much so that his statue itself the most properly to express his own nature and character must present externally the closest resemblance to the embalmed body or mummy of the Apis.

These facts in our opinion are sufficient to authorize the inference that Sarapis must have been from the first as much connected with the Apis as Osiris himself; but with the Apis of Amenthi, not with the Apis of Memphis: in which case, it would be a corollary to that conclusion that he must have been connected with an Apis cycle too; but a cycle which was reckoned from the death of the Apis, not from the birth; a cycle proper and peculiar to the Apis of Amenthi; a cycle which began in the lower world, just when it ended in the upper. Let us see then whether the matter of fact is calculated to verify this presumption.

The first cycle of the third Apis type came to an end, and the second began, Mesore 30, Nab. 467–468, October 26, B.C. 281. But the last nine months (the xxvith lunar year) of that cycle began Chœac 4, Nab. 467, Feb. 3, B.C. 281.

Nab. 467.		B. C.
Thoth	Nov.....2	282
Phaophi	Dec.....2	—
Athyr	Jan.....1	*281
Chœac	Jan....31	
Tybi	March ..1	
Mecheir	March..31	
Phamenoth	April.. 30	
Pharmuthi	May...30	
Pachon	June...29	
Paüni	July...29	
Epiphi	Aug....28	
Mesore	Sept. ..27	
Epagomenæ	Oct. 27	

Apis calendar.

Type iii, cycle i, 25–26.

	Days.			B. C.
i	30	Chœac....4	Feb. 3	*281
ii	29	Tybi......4	Mar. 4	
iii	30	Mecheir ..3	Apr. 2	
iv	29	Phamenoth 3	May 2	
v	30	Pharmuthi 2	May 31	
vi	29	Pachon ...2	June 30	
vii	30	Paüni 1	July 29	
viii	29	Epiphi 1	Aug. 28	
ix	30	Epiphi ..30	Sept. 26	
i	30	Mesore ..30	Oct. 26	

It appears therefore from these two schemes, that the lunar Pachon this year began on the 2d of the solar; and both these dates corresponded to June 30. There was a Metonic calendar also in Egypt at this time, the Macedo-Egyptian, in which too B. C. 282 answered to period i. 25; and the 1st of Panemus in that fell on June 30, B. C. 281: so that the Macedonian Panemus at this time corresponded exactly to the Apis Pachon; and both began on June 30 *.

Now we have made it appear that, if the Egyptian Pelosia were transferred to the Roman calendar any time between A. D. 128 and 131, their date in their proper calendar must have been Pachon 2; that is, the same day, which B. C. 281, Nab. 467, was coinciding with the Macedonian Panemus 1, the Julian June 30, and the first day of the 6th lunar month in the last year of the first Apis cycle of the type of Me-

* In the Corpus Ins. (iii. P. xxix. 420–423,) an inscription is extant (No. 4896) consisting of three parts, C. B. A.; and recording a petition of the priests of Philæ in Upper Egypt to the reigning king Ptolemy Euergetes II, and the two Cleopatras associated with him; and the answer or rescript of the king. In this last (A) a double date occurs, ῎Εῤ]ῥ[ωσθε L— —Πανέμ]ου $\bar{\beta}$. Παχὼν κβ΄. The Egyptian date is entire. The Grecian one is nearly illegible; and has been in some measure conjecturally only restored. When the inscription was first discovered, no part of this Greek date could be made out but the probable name of the month, Panemus. Since then professor Lepsius appears to have made out, or is supposed to have made out, the date of this month also, Panemus β, i. e. 2: which however must be a doubtful point, if the inscription from the first in this part of its contents was so much defaced.

Our Macedo-Egyptian calendar however will serve to recover the true date. It is agreed that the inscription must have been penned in one of the years comprehended between B. C. 127 and B. C. 117. The Egyptian date is still preserved, Pachon 22: and the Greek date must have been some day in Panemus, either the 1st or 2d. Now this being the case, the only year between B. C. 127 and B. C. 117, in which Pachon 22 could have coincided with one of these days in Panemus, is Nabon. 629; when the 1st of Thoth fell on Sept. 22 at midnight, B. C. 120, and the 1st of Pachon on May 20, and therefore the 22d on June 10, B. C. 119.

In the Macedo-Egyptian calendar this year, B. C. 120–119, answered to Per. iii. 35; when the 1st of Dius fell on Oct. 16, B. C. 120, and the 1st of Panemus on June 10, B. C. 119; the 6th of that month being exemtile. The true date therefore, which ought to appear on the stone in this instance in juxtaposition with Pachon 22, is Panemus 1, Πανέμου $\bar{\text{A}}$; but this might easily be mistaken for Πανέμου $\bar{\text{B}}$; in so imperfect and indistinct a state of the inscription.

sore 30, Nab. 442–443. It is self-evident that a cyclical date, like Pachon 2, might continue the same in terms ever after; even when it had long ceased to correspond to Panemus 1 or June 30: and that Panemus 1 might continue attached to the same season of the year as before, yet Pachon 2 might circulate with the cyclical calendar all round the year; and be the cyclical date of the Pelosia ever after, if it had once become so.

Now supposing that this date of Pachon 2, in the last year of the Apis cycle, was a stated date at this time, and possibly even that of the death of the Apis itself; let us see what consequences will follow from that assumption. First, if we reckon 118 days, or four calendar months, from Pachon 2, we shall come to Mesore 30; that is, to the end of this cycle and to the beginning of the next: and if we reckon on 177 days, or six calendar months, we shall come to Phaophi 24, the stated date of the birth of the Apis, (the representative of the next cycle,) in this type of Mesore 30, Nab. 442–443 [z]. And if we reckon on ten calendar months, or 295 days, we shall come to Mecheir 22: and if we reckon on seven days more, we shall come to Mecheir 29, the stated date of the natales in this type of the cycle also.

Now these are coincidences which cannot be resolved into chance: that four months from Pachon 2, in the last year of the cycle, should bring us to the end of the cycle; and six to the birth of the Apis, in the next cycle, and ten to his natales. They must have been the effect of contrivance. Every one must see that the four months or 118 days, from Pachon 2 to Mesore 30, were purposely intended to correspond to the four months or 118 days from Phaophi 24 to Mecheir 22: and the reason of this is explained at once, if Pachon 2, in this third type of the cycle, was the stated date of the death or disappearance of the Apis, at the end of one cycle, as Phaophi 24 was that of its birth, at the beginning of another.

It would follow from these arrangements and these coincidences too, that supposing such a thing as an Apis of the Amenthi, and a succession of cycles adapted to the Amenthi, as well as an Apis of the upper world, and a succession of

[z] See supra, p. 402.

cycles belonging to the upper world, its death on Pachon 2 in the upper cycle would be its birth on the same day in the lower; and the beginning of a new cycle in the upper world, four months after, would be the natales of the Apis of the lower world, and the date of a fresh cycle in that too. Pachon 2 indeed might be the stated date of the death of the Apis; but it could not be that of its burial, which must be preceded by its embalment; a long and tedious process, which would occupy 70 days of itself[a]: so that it is far from improbable that the actual time of the burial, which would be properly that of its final disappearance, and of the beginning of the public justitium or mourning for its loss, might be so ordered as to coincide with the very end of its proper cycle: in which case the analogy which we have just pointed out would be rendered still more striking; insomuch as the natales Apidis on this principle would be beginning to be celebrated in the Amenthi when the public mourning for its disappearance or death was just beginning in the upper world.

Now if these considerations do really justify the inference that, as there must have been a stated time in every cycle for the death of the Apis, as much as for its birth, and this stated time in the Apis type of Mesore 30, Nab. 442–443, was actually Pachon 2; then the connection of the Pelosia and of the Sarapea with this date, which we have already established on other grounds, can leave no reasonable doubt that the worship of Sarapis must have been connected with Pachon 2 from the first. And this connection also is explained by the fact that Sarapis himself, as the Osiris of the Amenthi, had a necessary relation to the Apis, but only to the dead Apis; and therefore a necessary connection with the day of his death too—just as much as the Osiris of the upper world with the day of his birth. There cannot be any question that the introduction of this god, in his proper character, whatsoever that was, was the effect of contrivance; and that in bringing it about the Greek and the Egyptian priests acted in concert. Among the former of whom Plutarch and Tacitus specify by name Timotheus, the ἐξηγητὴς, as Plutarch styles him, from Eleusis; and among the latter, Plutarch in

a Vol. ii. 556.

particular, the notorious Manetho, the Sebennite[b], the great oracle of our modern Egyptologers; who was found upon this occasion, and is represented by Plutarch in his simplicity, as in a most amiable concord of opinion, concerning this new god, with his brother-impostor Timotheus.

It was part of the scheme, concerted between them, that Sarapis' first recognition in his proper capacity of the Osiris of Amenthes, and of the Apis of the lower world, should fall out accordingly, just at the time of the death of the Apis; just when the ominous doors of the temple-vault at Memphis, (never opened except on such an occasion as that,) should be seen to be thrown back, in attestation of the fact of its death: and the first preparations for its burial itself should begin to be made. On this principle we account at once for the connection of the worship of Sarapis with Pachon 2, if that was really the stated date of the death of the Apis, at the proper time in every cycle. We see too that it was absolutely necessary his first reception and recognition should coincide with the close of an Apis cycle: and therefore that having to choose between two years, one of which must have been the date of that event, B. C. 281 and B. C. 280, we cannot hesitate to fix on the former, which answers critically to the required condition of being the last year of the cycle—whereas B. C. 280 would have been the first*.

* It is mentioned by Diogenes Laertius, that Demetrius Phalereus was said to have lost his eye-sight at Alexandria, and to have recovered it through Sarapis: *Λέγεται δὲ ἀποβαλόντα αὐτὸν τὰς ὄψεις ἐν Ἀλεξανδρείᾳ κομίσασθαι αὖθις παρὰ τοῦ Σαράπιδος. ὅθεν καὶ τοὺς παιᾶνας ποιῆσαι τοὺς μέχρι νῦν ᾀδομένους*, Lib. v. cap. v. sect. vii. Of this statement we accept only the latter part, that Pæans were extant in honour of Sarapis, believed to have been composed by Demetrius Phalereus. This however implies that he was at Alexandria, and still living, when Sarapis first became known there. Demetrius might be living B. C. 281. He certainly survived the death of Ptolemy Lagi, B. C. 284: and though Philadelphus is said to have put him into confinement of some kind (probably after his father's death) he is not said to have put him to death. He died at last of the bite of an asp; how long after Ptolemy Lagi, we are not told. This allusion to his Pæans in honour of Sarapis is critical. They must have been the first which either were or could have been written in honour of him.

[b] De Iside et Osiride, xxviii. Cf. Theodoret, Græcorum aff. Curatio, ii. § 94. p. 95.

It does not follow indeed from the preceding account that the relation of Osiris himself to the Amenthi, or to the Apis of the Amenthi, was a doctrine which had never been heard of in Egypt before the introduction of Sarapis. The contrary is much more probable: though, from the nature of the doctrine itself, it must have been confined to the priests; it must have made a part of their esoteric teaching concerning them both. It follows only that until the introduction and recognition of Sarapis there was no sensible representation of that particular relation. It should not be forgotten that the first idea of thus typifying the Osiris of the Amenthi, in the person of Sarapis, originated much more probably with the Greek priests of Egypt, than with the Egyptian; and that Sarapis from the first was quite as much an expression of their own Pluto, as of the Osiris of the Amenthi of the Egyptians. At any rate, he was an Alexandrine Osiris, much more than the proper Egyptian one of the same name.

For this reason too, it may very well be doubted whether this new impersonation of Osiris was ever cordially received by the native Egyptians, at least by the common people; who did not so readily fall in with the scheme as their own priests. Macrobius gives us to understand that the recognition of Sarapis as divine was not spontaneous on their part. They were compelled to it by the power of the Ptolemies. He adds too[c], Nullum igitur Ægypti oppidum intra muros suos aut Saturni aut Serapis fana recepit. horum alterum vix ægreque a vobis admissum audio: consequently there must have been some strong repugnance, on the part of the Egyptians in general, to both these objects of worship, as exotic, and foreign to their prejudices and predilections; particularly to Saturn, of whom the *alterum* is to be understood: whom nevertheless, according to the modern theory on this subject, they must have made the father of their own Osiris and Isis themselves—under the name of Seb. The comparative lateness of the introduction of the worship of Sarapis even into Alexandria, as an event merely of the reign of Ptolemy Philadelphus, must be admitted. And according to Origen[d], it could not have been

[c] Saturn. i. vii. 228.

[d] Contra Celsum, v. 34. opp. i. 603. D. cf. 37. 606 C–D. 38. 607 B. 608 A.

so long before his own time that he had got admission even into Naucratis in Egypt: Ναυκρατῖται δ' οὐ πάλαι ἀρξάμενοι ὠνόμασαν (ἐνόμισαν) Σάραπιν: and yet if the sophist Aristides (one hundred years before the time of Origen) is to be believed, he had 42 temples in Egypt, when he was there[e].

This date of Pachon 2, Nab. 467, which thus appears to have been that of the introduction of the worship of Sarapis, or of Osiris himself under a new name and in a new form, and of a fresh succession of cycles intended for the Apis of the Amenthi, is remarkable in another respect; viz. that it coincided with June 30, of which we have already established the fact that it was the date of the first recognition of the Apis itself, in the first year of the first cycle, Athyr 11, æra cyc. 3034, June 30 B. C. 973. We have a right to assume that this coincidence did not escape the Egyptians: and if it did not, that no time could possibly appear more proper for the introduction of Osiris in his new capacity in relation to the Apis of Amenthi, and for the institution of a new series of cycles adapted to that relation, than *this*; when the stated date of the death of the Apis of the upper world, Pachon 2, was falling at the same season of the natural year, and on the same Julian day, as the stated date of his recognition, Athyr 11, had done at first. For what was the death of the Apis of the upper world, but the birth of the Apis of the lower? and from what epoch could the cycles of the Amenthi be dated so properly at this time, as that of those of the upper world from the first*?

* The Nabonassarian Thoth B. C. 973, as our general tables shew, in the Julian notation was two days in advance of the cyclical. Athyr 11 in the latter then corresponded to Athyr 9 in the former: and Athyr 9, in the Nabonassarian type of the equable reckoning, æra cyc. 3034, corresponding to June 30 B. C. 973; Pharmuthi 9 in the same type, æra cyclica 3634, Nab. 375, would correspond to the same day, June 30 B. C. 373. Consequently, 92 years later, B. C. 281, June 30 would be found falling on Pachon 2, Nab. 467, as it is seen to have actually done.

[e] Orat. viii. Εἰς Σάραπιν. Pag. 96. l. 2. from the bottom.

SECTION VI.—*On the inferences deducible from the above conclusion, in explanation or illustration of some of the facts before considered.*

We shall now proceed to apply the conclusion at which we have arrived to its natural use and purpose, in illustrating and confirming some of the points which we have already had occasion to consider: the consistency of which too with this will be a further corroboration of its truth.

i. Fresh light is reflected by this conclusion on the fact to which we have already appealed, in illustration of the Apis cycle of type ii[f]; viz. that the arrival of Ptolemy Lagi in Egypt, B. C. 323, coincided with the close of a cycle, and even with the time of the death of the Apis, the representative of the cycle. The type of the cycle at that time being still the second, its date was Epagomene 5: and in this type, according to the analogy of type iii, the stated date of the death of the Apis must have been Pachon 7, five days later than Pachon 2. Nabon. 425 entered our Tables on Thoth 1 at midnight, Nov. 12 at midnight B. C. 324; and the 7th of Pachon of that year coincided with July 16 B. C. 323: from which day 118 days bring us to November 11; that is, to the beginning of the next cycle, Epagomene 5, Nabon. 425–426. The death of the Apis then in this instance must have happened on July 16: at least the stated time for the notification of its death, by throwing open the doors of the temple-vault in Memphis, and beginning the preparations for the ceremonies of its interment, must have been July 16. And these preparations had been begun when Ptolemy actually came into Egypt; but they were not yet over; they were still going on even then.

Now it admits of demonstrative proof, from the testimony of the Macedonian calendar, that the date of the death of Alexander at Babylon was June 13 B. C. 323: and as the first partition of his dominions among the Diadochi, by virtue of which Egypt in particular fell to the lot of Ptolemy, was not made in less than a month after his death; it follows that, whatsoever despatch Ptolemy might use in travelling to Egypt from Babylon, it would scarcely be possible

[f] Dissertation xiii. ch. v. sect. iii. vol. ii. 566.

in the nature of things for him to arrive there in less than three or four weeks time[g]. We may date his coming then between August 1 and August 15; but not before. We see therefore with how much propriety Diodorus might speak of the death of the Apis as a recent event at the time of his arrival; and of the preparations for his funeral rites as still going on. We may infer from the same coincidence, as we have already concluded, that, though the Apis must have died 118 days before the end of the cycle, its actual burial would not take place before the close of that period, that is, the end of the cycle itself*.

ii. Sarapis being from the first an Hellenic conception as much as an Egyptian one, (the Pluto in fact of the Alexandrine Greeks, corresponding to the Osiris of the Amenthes of the Egyptians,) and standing from the first in the same relation to Alexandria as Osiris to Memphis; there might be an Egyptian date indeed, consigned to the equable calendar from the first, which commemorated the introduction of the worship of Sarapis in that: but the proper memorial of the same kind would be perpetuated in the Greek calendar. The

* We know too little of the circumstances of the actual termination of the cycle before this, Nab. 400 B. C. 348, to hazard more than a probable opinion concerning them. But since it is agreed that the Apis which represented this cycle was put to death by Ochus, though not, as far as we could discover, prematurely, or much before its time, certainly not before B. C. 449, or 448, (see vol. ii. 575, Diss. xiii. ch. vi. sect. iii.) it is not impossible that the stated date of the death of the Apis, Pachon 7, at this time, and the peculiar time of the year at which it happened to be falling, may throw some light on the real circumstances of the fact; particularly on that which is the most remarkable of all; the Apis having been put to death on this occasion by being sacrificed to Typhon. Pachon 7 Nab. 400 coincided with July 22 B. C. 348; that is, it was only two days later than the stated date of the heliacal rising of Sirius at this time, and in this year of the cycle of leap-year, July 20. The Egyptians themselves connected Typhon with the dog-star; and Egyptian tradition attested the fact of sacrifices of human victims to Typhon, some time or other, in the dog-days, which began with the heliacal rising of Sirius. Cf. Plutarch, De Iside et Osiride, lxxiii. xxxi. It is far from improbable then, that Ochus took advantage of this coincidence to sacrifice the Apis to Typhon, on July 20 itself: which would be only two days before the time when it must have been made away with by its own priests.

[g] See our Dissertations, Diss. xviii. vol. ii. 141, 142.

Egyptian date would necessarily be cyclical, but the Greek one, being lunar and taken from the Macedo-Egyptian calendar, would be stationary within certain limits at least. And as both these dates originally met together, the former on the Apis Pachon 2, the latter on the Macedo-Egyptian Panemus 1, and each on the Julian June 30 B. C. 281; it is manifest that while the Egyptian Pachon 2 would be liable to fall back on June 30 perpetually, Panemus 1 within certain limits would always be more or less the same with this Julian date: and if that was the proper date of the Alexandrine Sarapea, they too would always coincide more or less with June 30.

Now it appears from the sophist Aristides that there was an annual festival at Alexandria in honour of Sarapis, in his time, at which his viiith Oration[h] was very probably delivered; as it certainly was in Alexandria[i]. This may be inferred from the apostrophe, *Ὦ τὴν καλλίστην ὧν ἐφορᾷς κατέχων πόλιν ᾗ σοι τὴν δι' ἔτους πανήγυριν πληροῖ*[k]. A festival of this kind, once attached to Panemus 1, might continue attached to it ever after: and though the Alexandrine correction of the equable Egyptian calendar had long been in use in Aristides' time, it does not follow that the proper lunar calendar of the Macedonian Greeks of Egypt had yet been laid aside in that country. It may be inferred from the Scholia on Aratus, and from the testimony of Theon, as we may probably see on a future occasion, that it was not yet superseded by the solar in the shape of the Alexandrine calendar, even 200 years later. In any case even the solar date of the Alexandrine Sarapea would naturally be taken from this lunar one of Panemus 1: and if the latter was properly June 30, so would the former most properly be: though Panemus 1 itself, in its own calendar, was liable to fluctuate between June 4 and July 2.

This coincidence however would be something remarkable. The summer solstice B. C. 281 was falling on June 27: and consequently the stated beginning of the inundation also, if that was always the summer solstice: and June 30 was so near to June 27, that the Sarapea and the inundation would

[h] Oratio viii. Εἰς Σάραπιν. [i] Cf. 87. 15. 97. 5 to the end.
[k] viii. 97. 5. Cf. also Ἱερῶν λόγων Γ. xxv. 489. 10.

be necessarily connected. And this connection being stated and regular must have the effect, if not from the first yet in course of time and at Alexandria in particular, of causing Sarapis to be looked upon as the presiding principle and the efficient cause of the inundation: to whose influence it was every year due. Add to this, that in the scheme of the lunar mansions, which we have already explained[l], as the cubit mansion, in which the Nile was supposed first to begin to rise, bore date at this time on June 17; so the mansion of influx or in-flowing, called *Termelia,* in which the increase of the waters was sensibly going on, bore date June 30; that is, on the Sarapea themselves. The relation of Sarapis therefore to the phenomenon of the inundation from the first must have been the closest imaginable: nor would it be surprising to find the phenomenon itself attributed to him in particular at last; or the Nilometer transferred to the Sarapeum, his temple at Alexandria, as its fittest place. It is clear at least, from the express language of Aristides, that the rise of the Nile in his time was ascribed to Sarapis: Οὗτος ἄγει Νεῖλον ὥρᾳ θέρους, οὗτος χειμῶνος ἀνακαλεῖ, οὗτος δύο καὶ τετταράκοντα ἱερὰ κατ' Αἴγυπτον ... συνέχει καὶ κοσμεῖ[m]. And this language implies too that the *recall* of the Nile, that is the beginning of the inundation in some sense or other, under the auspices of this god, took place in the winter; though its proper completion and effect did so only in the summer. We have seen that in the Sothiacal calendar of the Egyptians, the best known of their types of the Julian calendar, the season of the waters began on March 18: and at the time of this visit of Aristides to Egypt, which was certainly made long before A. D. 158[n], it is far from improbable that Pachon 2, the stated Egyptian date of the Sarapea, was either actually falling on March 18, or had very recently done so; so as actually to connect the Sarapea with the season of the waters: that is, the season of the inundation in some sense or other even with the winter.

iii. Hence too we may probably explain, (at least to a certain extent,) the singular fable which we began with pro-

[l] Vol. iii. 572, Diss. xv. ch. x. sect. 1.

[m] viii. Εἰς Σάραπιν, 96. 3. from the bottom.

[n] See our Dissertations, Appendix, Diss. xxvii. vol. iv. 533 sqq.

ducing from Lydus. The apparition, alluded to in that fable, must have been intended of Sarapis; and of his first manifestation too: and it is clear, from the fable, that this is to be supposed to have coincided with the summer solstice; with the time at least when the Nile ought to have been beginning to rise. Sarapis was actually introduced into Egypt, and the Sarapea were first instituted, at this very season of the natural year; and so far there was an historical foundation even for the fable itself.

With regard to the further circumstance of the appearance of this dæmon with its body plaistered over with mud, (the most important of all to the explanation of the origin of the Pelosia,) that too might have a foundation in the manner of representing Sarapis, which seems to have been employed even from the first. Sarapis was the living type of the dead Apis: and the statues of Sarapis were purposely assimilated in their external appearance to the mummies of the Apis. If Sarapis was traditionally reported to have been manifested on this first occasion, in the likeness of one of his own images, particularly of the oldest of all ascribed to Bryaxis; he must have been manifested as if covered with the gums and cerements of the embalmed Apis; which being both glutinous and dusky resembled nothing so much as a coating of the mud of the Nile. We do not hesitate to believe ourselves, on the strength of this tradition, that the annual exhibition of an human figure, daubed and plaistered over with the mud of the Nile, made part of the Sarapea from the first.

As to the remaining particular of Lydus' account of this apparition, a failure of the inundation at its proper season, and a consequent dearth, or apprehension of dearth, in Egypt; we know not whether there was any foundation for the former in the matter of fact, B. C. 281; but with respect to the latter, Suidas, or rather Cedrenus quoted by Suidas, connects even the reception of the Apis in Egypt with a famine there some time or other[o]: and Clemens Alexandrinus, as we have seen, connects that of Sarapis with a time of general scarcity too. And as to the former circumstance, the failure of the inundation; the Nilometer was under the

[o] Σάραπις.

control of the priests. It was their privilege to announce both the beginning of the inundation and its progress from day to day. And as the actual reception or recognition of Sarapis bore date June 30, but the stated or traditionary date of the rise of the Nile was that of the cubit mansion June 17, or that of the solstice June 27, nothing was easier than so to order the matter, if they thought proper, as to make the people believe that the Nile had exhibited no symptoms of rising, as usual, this year, before the first proclamation and first recognition of this new manifestation of Osiris in the person of Sarapis—which would thus appear like a special interposition of his own, to secure to the people the greatest of their national blessings.

iv. The conclusions established may lead us in like manner to a probable explanation of the name of Sarapis. We do not think it necessary to collect the various instances of the occurrence of this name in the Greek and in the Latin writers of antiquity: between whom however this distinction is very generally found to prevail; that in Latin, the word is most commonly Serapis [p], in Greek, and especially in the best informed and most classical Greek authors of these times, it is almost always Sarapis [q] *. Σόραπις, Σορόαπις, or Σίραπις, as we have seen, occur; but are of no authority either for the etymon, or for the orthography, or for the pronunciation.

Plutarch, as we have seen, was disposed to dispute the exclusive right of the Egyptians to the name of Ὄσιρις—which he thought was to be derived from the Greek ὅσιος and ἱερὸς, as properly as from any thing else [r]; but he gives up Sarapis to them entirely. He justly therefore rejects the explanation of this name which appears to have been pro-

* In the Ortus Alexandri, (the work of a Greek writer, called Æsopus, and translated into Latin by Julius Valerius,) edited by Maius, Milan,

p Lucilius, Fragmenta, supra, vol. ii. 445, note. Varro, De Lingua Latina, iv. 17: Fragmenta, 430. Augustin, De Civitate Dei, xviii. 5. Historiæ Augustæ SS. Spartianus, Severus, 17. Vopiscus, Saturninus, 8. Arnobius, i. 20. Though the middle syllable is certainly long in this word, Prudentius shortens it: Contra Symm. lib. i. 531. 867, 868. Ausonius shortens it also.

q Callimachus, xviii: Anthologia, i. 216, 217. Diodorus, i. 25. Dio Cassius, xl. 47. and passim. Aristides, viii. εἰς Σάραπιν. Nonnus, xl. 399. Origen, Contra Cels. v. 34: Opp. i. 605. D. Sextus Empiricus, iii. 24. p. 183. § 220. Artemidorus, Oneirocritica, ii. 44, &c.

r De Iside et Osiride, lxi.

posed by Phylarchus; as if it were compounded of *σαίρειν* (in the sense of *καλλύνειν* and *κοσμεῖν*) and *πᾶν*[s]; implying that Sarapis was the name *τοῦ τὸ πᾶν κοσμοῦντος*. And though he gave us to understand that the Grecian Pluto was called Sarapis by the Egyptians; this does not prove that even Pluto was yet known to them by any such name before the appearance of Sarapis: only that Sarapis having appeared and having been received among them under that name from the first, yet in a character analogous to that of the Hellenic Pluto, the name of Sarapis was naturally transferred from him to Pluto.

The name is evidently a compound one; and one of its elements is evidently the Greek form of the Egyptian Hapi, the name of the Apis. The other consequently is *Sar*, either a distinct term in itself, or abbreviated from some other, to adapt it to entering into composition with Ἆπις. Now we learn from Plutarch that the Egyptian word for *τὴν ἑορτὴν, τὰ χαρμόσυνα,* as he explains it, was *Sairei:* Ἐγὼ δὲ, εἰ μὲν Αἰγύπτιόν ἐστι τοὔνομα τοῦ Σαράπιδος, εὐφροσύνην αὐτὸ δηλοῦν οἴομαι, καὶ χαρμοσύνην· τεκμαιρόμενος ὅτι τὴν ἑορτὴν Αἰγύπτιοι τὰ χαρμόσυνα σαίρει καλοῦσιν.[t] It is possible that the particle *καὶ* has here dropt out of the text of Plutarch before *τὰ χαρμόσυνα*: or if not, then he must be understood to use *τὴν ἑορτὴν* just before emphatically, and *κατ' ἐξοχὴν*, in the sense of

A.D. 1817, Sarapis thus describes his own name, according to the numeral value of the characters which composed it in Greek, lib. i. 34:

Sub grata primum bis centena littera	Σ
Unum repone numerum, et centum dehinc	Α Ρ
Unumque post id, tunc quater viginti sint,	Α Π
Decemque juxtim; eaque sit novissima	Ι
Quæ prima fixa est, eaque sit nomen mihi.	Σ.

These characters are seven in number; hence in Hesychius, Ἑπταγράμματον . . . καὶ Σάραπιν.

There is an epigram also in the Greek Anthology, in which the name is similarly alluded to:

Ἑπτά με φωνήεντα θεὸν μέγαν ἄφθιτον αἰνεῖ
  γράμματα τὸν πάντων ἀκάματον πατέρα·
εἰμὶ δ' ἐγὼ πάντων χέλυς ἄφθιτος, ἣ τὰ λυρώδη
  ἡρμοσάμην δίνης οὐρανίοιο μέλη.[u]

iv. 176. Ἀδέσποτα, CCLXXX.

s De Iside et Osiride, xxix.
t Ibid.

u This epigram is founded on Phylarchus' explanation of the name.

τὰ χαρμόσυνα: and that being supposed the corresponding meaning of the Egyptian *σαίρει*, then in composition with Ἆπις, and in the form of *Σάραπις*, it would denote *ἡ ἑορτὴ*, *τὰ χαρμόσυνα τοῦ Ἄπιδος*: and this supplies the best and most consistent explanation of the name itself. All festivals are or should be *χαρμόσυνα*. They are all occasions of joy and gladness. But this of the Apis, that is, this of Sarapis, was so in particular; and that too is explained at once, if it was connected from the first with the inundation; the most festive season of the year to the Egyptians, and devoted while it lasted to nothing but pastime and amusement. It is possible too that such a name might be intended at first to imply the particular interest of the Apis itself in the festival of Sarapis; especially as at first imposed, and with a special reference to a certain period of the Apis cycle. We have seen that the end of a cycle in the upper world was the beginning of one in the lower; and the death of the Apis in the former was the beginning of his existence in the latter. His death and disappearance might be a cause of grief and mourning to the upper world; but his birth and appearance in the Amenthes would be an occasion of rejoicing there: in which too, it is easy to see, the Apis itself must have a particular interest. We should consider this in reality the true explanation of the name. It was meant to denote *τὴν ἑορτὴν*, *τὰ χαρμόσυνα, κατ᾽ ἐξοχὴν*, of the Apis itself, by its migration to the Amenthi, and by its reception there.

v. Singular as the custom may seem of celebrating the Sarapea in Egypt among the Greeks of that country, in this particular manner, by smearing the body over with *πηλὸς* or mud; it was not peculiar to the Greeks of Egypt, nor confined to one object of worship, Sarapis. We read of a similar ceremony at Pergamus, in honour of Æsculapius; the stated time of which, as it may be collected from Aristides the Sophist also, was the spring; only *at* or *after* the vernal equinox, not *before* it: *Ἦν ἰσημερία ἡ μετὰ χειμῶνα, ὅτε πηλοῦνται τῷ θεῷ* [u]. Æsculapius then, in the time of Aristides, was

[u] *Ἱεροὶ λόγοι*, B. 484. 15: cf. 485. 20. 10. He was now at Pergamus himself, 483. 20; the time, as we apprehend, being A. D. 158 or after: 484. 6. See the chronology of these *ἱεροὶ λόγοι* in our Dissertations, Append. Diss. xxvii. vol. iv. P. ii. 533 sqq.

honoured at Pergamus just in the same way as Sarapis at Alexandria. Sarapis and Æsculapius, for some reason or other, appear to have been regularly associated in a common capacity, as the gods of healing or medicine: An Æsculapius, an Serapis, potest nobis præscribere per somnium curationem valitudinis?[w]—Ego medicina a Serapi utor: quotidie precantur[x]. The ἱεροὶ λόγοι of Aristides are full of the proofs of this community of the estimation, and of the almost personal identity, of these two divinities; particularly at the point of time to which those λόγοι belong, when there might be particular reasons, resolvable into the progress which Christianity was making every where, and into the miracles of healing with which it was notoriously accompanied, for exaggerating the fame and credit of these two pagan gods of healing also[y]. Some of the ancients do not scruple even to identify Sarapis with Æsculapius: for example, Ammianus Marcellinus; who speaks of Memphis in his own time as Præsentia numinis Æsculapii clara[z]: and we have little doubt that it was the same kind of confusion of Sarapis with Æsculapius, the Greek god of medicine, and the identity of Sarapis with the Apis, which gave occasion to the Christian fathers, and to the later Greek grammarians, to represent the Egyptian Apis as the inventor of medicine, or as the author of the art of healing[a].

The question is however, On what grounds was the character of one of these powers identified with that of the other? and which was the more ancient conception of its kind, Æsculapius or Sarapis? There can be no doubt Æsculapius, even among the Greeks; if Sarapis became known to them first, under that name at least, only in B. C. 281. But with respect to Æsculapius himself, the truth is that he was not an original conception of the Greeks. His birth-place was Sidon in Phœnicia: and there he was first conceived and first proposed in a character analogous to that of the Egyptian Osiris; yet with such a modification of the Egyptian conception

[w] Cicero, De Divinatione, ii. 59,123.

[x] Varro, apud Nonium in Precari, Fragmenta, p. 276.

[y] See our Dissertations, Appendix, xxvii. vol. iv. Part ii. 608–610, note.

[z] xxii. 14. p. 318. Cf. Cyrillus, contra Jul. Lib. vii. 204. D.

[a] Suidas, Ἆπις: Γράμματα. Clemens Alexandrinus, Strom. i. xvi. § 75. p. 53. l. 28. Theodoret, Græcorum Affectuum Curatio, iii. § 26. p. 116.

of Osiris that his own might be predisposed to be amalgamated with that of Sarapis. We have no doubt at least that the middle term between the Sidonian Æsculapius and the Alexandrine Sarapis was the Egyptian Osiris; and that they were necessarily to be supposed to agree with each other, because they both agreed with him.

The Sidonian correction of the primitive calendar was attached to March 31, B. C. 889: and this is the date of the deification of their Æsculapius also. Of all the cities of the Greeks in Asia Minor in after times, the worship of Æsculapius was most characteristic of Pergamus; for which reason, in the book of Revelation, the throne of Satan itself is said to have been *there*, when the letter was indited to the angel of Pergamus: and that statement at that time was literally true, as the ἱεροὶ λόγοι of Aristides (not many years later) alone would prove. Pausanias tells us [b] the worship of Æsculapius was introduced into that city from Epidaurus; but he does not say when. The Asclepiëa appear to have been introduced from Epidaurus also, at the same time; and it is in our power to render it extremely probable, if not absolutely certain, that these were attached to March 20. The cyclical date of the Serapea, Pachon 2, in due time must fall on March 31: and this was the case Nab. 831, when Thoth 1 fell on August 3, A. D. 83. In this year we consider it probable that the ceremony of the πήλωσις was first instituted at Pergamus, in honour both of the Egyptian Sarapis, and of the Sidonian Æsculapius, and of their own Æsculapius all at once. On this point however we cannot go any further into particulars at present.

vi. With regard to the Roman Pelosia, the date of which appears to have been March 20; if it was introduced into the calendar, as we have supposed, when Pachon 2 was coinciding with March 20, it must have been introduced, as we have also seen, A. D. 128–A. D. 131: and therefore by Adrian. The causes or motives which led to its adoption at this time are left to conjecture, and probably never will be certainly known: but we are much inclined to believe that it had something to do with an indisputable fact of the reign of Adrian, in the course of his visit to Egypt, A. D. 128, con-

b ii. xxvi. 7. Cf. iii. xxvi. 7.

cerning which the accounts of the ancients vary; so that, though the incident itself is unquestionable, its circumstances are involved in mystery. We mean the death of Antinoüs. It is certain that Antinoüs accompanied Adrian in his visit to Egypt, and that he died in Egypt in the course of it; and that he died by drowning: he perished in the waters of the Nile. But whether he was drowned by accident, or whether he was sacrificed by Adrian, or whether he devoted himself in some manner or other for Adrian, has been left in uncertainty[c]. It is most probable that, if his death was not purely accidental, it was an act of self devotion; for we cannot believe that Adrian sacrificed him: in whose reign the ancients have told us that human sacrifices were first put down by law. Nor would that be consistent with the honours heaped on him after his death; his deification, his reception among the constellations of the sphere; the city, the temple, the oracle, all founded in Egypt in his name, and either by Adrian, or to please and flatter Adrian.

According to Spartian[c], Antinoüs fell into the Nile, as he and Adrian were sailing up or down that river together; consequently in the spring, between the arrival of Adrian and the inundation. It is possible this accident might happen very near the date of the cyclical Pelosia, Pachon 2: and upon that coincidence Adrian might ground his adoption of the cyclical Pelosia into the Roman calendar. The Egyptians had a traditionary Antinoüs (i. e. an Antinoüs in youth and beauty, and in the untimeliness of his end, the counterpart of this favourite of Adrian's,) whom they associated with the fable of Osiris and Isis also; and this was their Maneros[d]: and he too was said to have fallen into the sea and perished, and, what is more to our purpose at present, he was called Pelusius, or, as the text of Plutarch may very probably require to be corrected, Pelosius. These traditions and this name are older than Adrian's visit to Egypt, and the death of Antinoüs; for they appear in Plutarch De Iside: but the

[c] Cf. Historiæ Augustæ SS. Spartian, Adrian. 14. Dio or Xiphilinus, lxix. 11. Pausanias, viii. ix. 4. Athenæus, xv. 21. Clemens Alex. Protrepticon, cap. iv. § 49. p. 42. l. 29. Photius, Cod. 279. Helladius, p. 535. l. 39: from which we learn that the name of the city was Bes-Antinoüs or Bes-Antinoöpolis. In Ptolemy (Geog. iv. cap. 5 § 61.) Ἀντινόου πόλις is the metropolis of the νομὸς Ἀντινοΐτης.

[d] Plutarch, De Iside et Osiride, xvi. xvii: cf. Herodotus, ii. 79.

comparison which they would suggest between Maneros and Antinoüs would be too striking to be overlooked at the time; and that might lead in the event to the institution of the Roman Pelosia.

vii. Lastly, it appeared that when the emperor Marcus Aurelius separated the Roman Serapea from the Pelosia, he transferred them to vii kalendas Maias, April 25. This was a well known date in the Roman calendar. It was that of the Robigalia, or Rubigalia[e]; an institution according to Pliny[f] as old as Numa Pompilius himself. Robigo is the Latin for mildew; and the Robigalia, literally rendered, meant the rites or the ceremonies appertaining to mildew; that is, the object of which was to avert the mildew from the growing corn. The explanation of this is that there were four days, from the vii Kal. Maias April 25 inclusive to iv Kal. Maias April 28 inclusive, devoted, as it was supposed every year to the vespertine or heliacal setting of Canicula, and the Sidus Canarium: and therefore the most dangerous and critical time, as it was also supposed, to the esculent fruits of the ground, the wheat and the barley just shooting or ready to shoot into the ear; lest they should be mildewed and blighted through the influence of this constellation, and especially of the dog-star. To avert this risk, to propitiate this dangerous power, a dog was sacrificed to Canicula every year on this day, vii Kal. Maias; of which Ovid has given a particular account[g]: and the institution of this sacrifice was traced up to Numa himself. The ceremony at least was of undoubted antiquity in the Roman calendar; and Pliny has preserved the form of words in which it was every year prescribed[h]: Equidem ipsa etiam verba priscæ significationis admiror: ita enim est in commentariis Pontificum: Augurio canario agendo dies constituantur, priusquam frumenta vaginis exeant, et antequam in vaginas perveniant.

Now if Sarapis had a stated connection with the rise of the Nile, it might be supposed that he had also some connection with the dog-star; and that the most likely means to mitigate the influence of the dog-star was to propitiate

e Kalendaria, apud Foggini, Aprilis, Maff. and Prænestinum.

f H. N. xviii. 69. § 3. Cf. Varro, De Lingua, Lat. v. 56. Festus, xvi. 451. 16.

g Fasti, iv. 901–942. cf. Columella, x. De Hortorum Cultu, 343.

h H. N. xviii. 3.

Sarapis: or he might be regarded as the sanitary, healing, and beneficial principle on a large scale, opposed to every thing hurtful and deleterious, and of a contrary tendency, in every way. But the true explanation of this transfer of the Sacrum Serapidis to the date of the Robigalia appears to us to be that, according to the Egyptians themselves, Sarapis was the presiding principle of the wind or air; which must be considered the natural instrument in all such natural effects as this of mildew. Ἐν δὲ ταῖς Ἑρμοῦ λεγομέναις βίβλοις ἱστοροῦσι γεγράφθαι περὶ τῶν ἱερῶν ὀνομάτων ὅτι τὴν μὲν ἐπὶ τῆς τοῦ ἡλίου περιφορᾶς τεταγμένην δύναμιν Ὧρον, Ἕλληνες δ' Ἀπόλλωνα, καλοῦσι· τὴν δ' ἐπὶ τοῦ πνεύματος οἱ μὲν Ὄσιριν οἱ δὲ Σάραπιν οἱ δὲ Σῶθι Αἰγυπτιστί[h]. Whether the jurisdiction of the air belonged to Sothis, i. e. to the dog-star, or to Sarapis, M. Aurelius probably thought the best way of neutralising the baneful, and strengthening the beneficial, influence connected with it, was to transfer the Sacrum Serapidis to the Robigalia.

CHAPTER IV.

On the date of the foundation of Memphis; and on the Grecian Fable of Io and Epaphus.

SECTION I.—*The statements of antiquity, with respect to the foundation of Memphis, derived from the Egyptians, unworthy of credit.—Memphis not older than the Apis.*

While we were engaged on the investigation of the different points, which we have been discussing in this and in the preceding dissertations, and were collecting our materials for that purpose; we thought it incumbent upon us to collect also the testimonies extant on this particular question of the foundation of Memphis, and of the age of Memphis. But we are now so fully convinced of the little dependence which can be placed on any such statements derived from the accounts of the Egyptians merely, that we consider it useless to produce them. We shall be content to state the matter of fact; as it must have held good, if the conclusions,

h Plutarch, De Iside et Osiride, lxi.

which have been established in the preceding parts of our work, are true.

i then: The antiquity of Memphis cannot have been greater than that of the first introduction of the worship of the Apis. ii. The first introduction of the worship of the Apis cannot have been older in Egypt than the first institution of the Apis cycle. iii. The Apis cycle of the Egyptians neither is nor can have been older than B.C. 973. No exception can be taken to the truth of the third of these propositions; the proof of which amounts to a demonstration. None can be taken to the truth of the second; which rests on the same foundation as the third: and no *reasonable* exception can be taken to the truth of the first. These three propositions being admitted; the reason of a child is competent to draw the conclusion, which naturally, spontaneously, and necessarily results from them, that Memphis itself could not have been older than B.C. 973.

With regard to the two latter of these propositions, we maintain, and we believe that we are justified in maintaining, that they are indisputable; that they are most certain and unquestionable statements of a simple truth or matter of fact. With respect to the first, we have qualified our assertion by saying that no *reasonable* exception could be taken to its truth: for we are aware that it may be objected *prima facie* to this proposition in particular, that Memphis might be older than the deification of the Apis, and the institution of the Apis cycle; and yet might have been connected both with the Apis and with the Apis cycle, from the time when they came into being: so that the date of the deification of the Apis and that of the Apis cycle would be no necessary proof of the age of Memphis.

In answer to this objection we observe first of all; That we know of the existence of this city of ancient Egypt only through its name of Memphis; and Memphis is only the Greek form of the name of this city: it is not the proper Egyptian form of its name. Secondly that according to Plutarch[i] the proper Egyptian name of this city carried along with it from the first the idea of a special relation to the Apis or to Osiris: Ἐν δὲ Μέμφει τρέφεσθαι τὸν Ἆπιν, εἴδωλον ὄντα

[i] De Iside et Osiride, xx.

τῆς ἐκείνου ψυχῆς, ὅπου καὶ τὸ σῶμα κεῖσθαι. καὶ τὴν μὲν πόλιν οἱ μὲν ὅρμον ἀγαθῶν ἑρμηνεύουσιν, οἱ δ' ἰδίως τάφον Ὀσίριδος: that is, the Egyptian name of the city meant either *ὅρμος ἀγαθῶν*, or *τάφος Ὀσίριδος*; but in either case it implied a particular relation to the Apis or to Osiris: Ὁ *γὰρ* Ἆπις, as he observes in another instance[k], *δοκεῖ μετ' ὀλίγων ἄλλων ἱερὸς εἶναι τοῦ Ὀσίριδος—Οἱ δὲ πλεῖστοι τῶν ἱερέων εἰς τὸ αὐτό φασι τὸν Ὄσιριν συμπεπλέχθαι καὶ τὸν Ἆπιν, ἐξηγούμενοι καὶ διδάσκοντες ἡμᾶς ὡς εὔμορφον εἰκόνα χρὴ νομίζειν τῆς Ὀσίριδος ψυχῆς τὸν Ἆπιν*[l].

Of these two explanations of the name in Plutarch's time, according to the supposed proper meaning of the Egyptian terms of which it was compounded, it appears from the modern writers on hieroglyphics that the first is entirely in accordance with the truth; for they too inform us that the proper name of Memphis, translated from the hieroglyphic, is Me-nofri[m]; which they also explain, in conformity to Plutarch's version of it, as equivalent to Ma-n̄-nofri, meaning "the abode of good." It seems then that whether as the "abode," or "haven of good," or as the "burial place of Osiris," the proper Egyptian name of this city, of which the Greeks made Memphis, (Me-nofri, Menfri, Μένφρις Μέμφις,) conveyed, in its very etymon, in its composition and constitution itself, the idea of a special relation to the Apis. We ask then, was this its name from the first; or was it not? If it was not; we demand, what was its name at first? in what respect did it differ from this? where is it found? or from what quarter is any thing known of it at present? These are questions which no one can answer except from his own imagination. But if it was; then we demand in like manner, if Memphis was known by this name, and this name only from the first, whether it must not have been associated with the Apis from the first? or whether any thing could have made it the "Abode of good," or the "Burial place of Osiris," from the first, but its connection with the Apis, and through the Apis with Osiris, from the first? Another of the hieroglyphical names of Memphis is Pthah-ei; i. e. the Abode of Pthah[n]: of Phthas, the Egyptian Vulcan,

[k] De Iside et Osiride, lxxiii.
[l] Ibid. xxix.
[m] Wilkinson, Second series, iii. x. 278. cf. ix. 147. First series, i. ii. 175, note.
[n] Sir Gardiner Wilkinson, loc. cit.

who was associated with the Apis there, and had a temple contiguous to the Apiëum itself, and under the same roof[o]. Had no name of Memphis but this been handed down traditionally; who could have doubted, from the testimony of such an appellation, that it must have been connected with Phthas, and consecrated to Phthas, from the first? The Apis was older in Memphis itself than Phthas: nor was the Apis associated in Memphis with Phthas, but Phthas with the Apis: and the actual name of Memphis, the only name which can be considered proper and peculiar to it, implies its relation to the Apis not to Phthas. It is on every account a reasonable inference from this fact, that Memphis and the Apis were connected together from the first; that Memphis would never have had the name of Memphis but for its connection with the Apis: and that is substantially and in effect the same thing as saying that Memphis would never have been Memphis but for its connection with the Apis *.

There is consequently no foundation for the objection that Memphis might have been older than the Apis, and yet connected with the Apis from the first. This is not possible of Memphis as Memphis. As to any other city, and under

* No fact in ancient history is more notorious than the connection of the Apis of the Egyptians with Memphis, and *vice versa*: so much so, that in Hesychius[p] the gloss on Ἀπιακὸς ἄρτος is ὁ Μεμφιτικός: and yet the worship of the Apis was not peculiar to Memphis[q].

The Scholiast on the Persæ of Æschylus[r],

Ὅ τε τῆς ἱερᾶς Μέμφιδος ἄρχων,

observes, Ἱερὰν τὴν Μέμφιδα καλεῖ, διὰ τὸ τιμᾶσθαι ἐκεῖ τὸν Ἄπιν, καὶ μυστήρια τοῖς Αἰγυπτίοις γίνεσθαι.

In the Argonautica, ascribed to Orpheus, we read[s],

Ἠδ' ὅσον Αἰγύπτῳ ἱερὸν λόγον ἐξελόχευσα
Μέμφιν ἐς ἠγαθέην πελάσας ἱεράς τε πολῆας
Ἄπιδος, ἅς περι Νεῖλος ἀγάρροος ἐστεφάνωται,
ταῦτα μαλ' ἀτρεκέως ἀπ' ἐμῶν στέρνων δεδάηκας.

And in the Hymn to Apollo, among the Orphica also, Apollo himself, as the same with Osiris, is styled Μεμφίτης absolutely[t]:

Ἐλθὲ μάκαρ παίαν Τιτυοκτόνε Φοῖβε λυκωρεῦ
Μεμφῖτ' ἀγλαότιμος.

o See vol. ii. 546. Diss. xiii. ch. iv. sect. i.

p i. p. 451.

q Cf. Le Tronne, Recueil, xxv. i. P. ii. 296.

r ver. 36.

s ver. 43.

t xxxiv. Ἀπόλλωνος Θυμίαμα. Μάνναν.

any other name, we know nothing of it ourselves; and we are sure no man living knows any thing either of its existence or of its name any more than we ourselves. The question with which we are concerned is that of the origin of Memphis, that of the antiquity of Memphis; of the city which is known to history by that name; of the city connected with the grandeur of Egypt, of the city which, after a time, passed for the capital of Egypt. This city, not only the common tradition and belief of the Egyptians, but its very name, proves to have been always connected with the Apis; and never to have existed under that name apart from the Apis.

On this particular question of the antiquity of Memphis, an observation was to be found in the Meteorologica of Aristotle, which is so obviously the dictate of common sense, that it would not have been totally lost on the learned, as it appears to have been, had not their better judgment on all questions of Egyptian antiquity and Egyptian chronology been thoroughly blinded by their prejudices. *Φαίνεται δ' οὖν*, says he[u], *καὶ τὰ στόματα πάντα πλὴν ἑνὸς τοῦ Κανωβικοῦ χειροποίητα καὶ οὐ τοῦ ποταμοῦ ὄντα, καὶ τὸ ἀρχαῖον ἡ Αἴγυπτος Θῆβαι καλούμεναι. δηλοῖ δὲ καὶ Ὅμηρος οὕτω πρόσφατος ὢν ὡς εἰπεῖν πρὸς τὰς τοιαύτας μεταβολάς· ἐκείνου γὰρ τοῦ τόπου ποιεῖται μνείαν, ὡς οὔπω Μέμφιος οὔσης, ἢ ὅλως ἢ οὐ τηλικαύτης.* No one can deny that this is a sensible and natural remark; and a very reasonable inference from an unquestionable matter of fact: viz. that Homer has spoken of Egyptian Thebes in terms even of exaggerated praise[w], and yet is totally silent concerning Memphis; which in Aristotle's time was a much more considerable city than Thebes; and if the accounts of the Egyptians themselves were to be believed had been so from time immemorial: had been at least the rival of Thebes in grandeur, importance, and dignity, from the first. We hope to have a future opportunity of discussing the question of the age of Homer: but since it

u Meteorologica, i. 14. Opp. i. 351. 32.

w *Οὐδ' ὅσ' ἐς Ὀρχομενὸν ποτινίσσεται, οὐδ' ὅσα Θήβας*
Αἰγυπτίας, ὅθι πλεῖστα δόμοις ἔν κτήματα κεῖται·
αἵ θ' ἑκατόμπυλοί εἰσι, διηκόσιοι δ' ἀν' ἑκάστην
ἀνέρες ἐξοιχνεῦσι σὺν ἵπποισι καὶ ὄχεσφιν.
Iliad, I. (ix.) 381.

Cf. the Scholia in loc. and ad Odyss. iv. 126.

does not appear from any part of the Iliad or of the Odyssey that he ever visited Egypt in person, or that he knew any thing concerning it except from hearsay, his silence respecting Memphis, notwithstanding his mention of Thebes, is easily explained, if Memphis was probably not 50 years old at the time of his birth, and Thebes was already known to fame far and wide, and long had been so, as one of the greatest and most populous cities in the world.

SECTION II.—*On the true founder of Memphis; and on the true date of its foundation.*

With regard then to the true founder of Memphis, and to the true time of the foundation itself; there cannot be any doubt that, if it was connected with the Apis from the first, its founder must have been the king who was reigning in Egypt at the time of the introduction of the worship of the Apis: and there can be none that this king in particular was Shishak. We have seen from the testimony of Scripture that Shishak was reigning in Egypt a few years before B. C. 974, the date of the death of Solomon; and was still reigning in Egypt four years after that event, B. C. 970[x]. He must therefore have been reigning B. C. 973—at the epoch of the Apis cycle.

This king, whom Scripture denominates Shishak, the monumental chronology designates by the name of Sheshonk[y], or Shishonk: and a king with a name which approximates to this of Sheshonk, (Sesonchis, Sesonchois, Sesac, or Shishak[y],) Sesonchosis, stands at the head of the xxiid dynasty. Sesonchosis is the name given to Sesostris, in the Scholia on Apollonius Rhodius[z], from Dicæarchus: and it would seem to be only accidentally different from the Sesoösis of Diodorus Siculus[a]; though on the monuments themselves Sesonchosis is the first king of the xiith dynasty, and Sesostris is the third.

The fact of the invasion of Judæa by Shishak, in the fifth year of Rehoboam, the son and successor of Solomon, is distinctly attested by the book of Kings and the book of

x 1 Kings xiv. 25, 26: 2 Chron. xii. 2–9: cf. vol. ii. 528. Diss. xiii. ch. iii. sect. viii.

y Egyptian Antiquities, i. p. 16: cf. Nolan, Egyptian Chronology, part iv. sect. v. p. 451. 478: Sir Gardiner Wilkinson, First series, i. ii. 136.

z iv. 272.

a i. 53. 58.

Chronicles: but the motives to this invasion are not specified. No provocation appears to have been given by the king of Judah, or by his people, to lead to it. It seems to have been a spontaneous act of aggression, on the part of Shishak; and so far a wanton and unjustifiable violation of the law of nations, worthy only of a robber and freebooter, tempted by his own cupidity. If it served, in the hands of Providence, as a means of punishing Rehoboam and his people, for their defection from God; that is no explanation of the conduct of Shishak himself, nor any exculpation of it. In our opinion, without any regard to the judicial and extraordinary purpose which this invasion was appointed to serve in the dealings of the Deity with his own people, no rational or consistent account can be given of it, so far as concerns the motives of the king of Egypt, except by means of the effect which is seen to have resulted from it; i. e. That Shishak, having by force and intimidation made himself master of Jerusalem, having been permitted at least by the Deity to become master of Jerusalem without resistance, carried away to Egypt all the treasures which Solomon had amassed during the course of his long reign. In the simple but emphatic language of Scripture, he "took all[b]:" "he even took away all[c]," both what was to be found in the temple, and what was to be found in the king's house: he left nothing behind him; he carried all away into Egypt. But it does not appear that he took any thing away except these treasures; or in particular that he carried away any captives: though the monuments and sculptures, with their usual effrontery and shameless disregard of truth, have made the learned in such things both believe and inculcate the contrary; especially, since the discovery of a tomb, supposed to be that of Sheshonk or Shishak himself[d], on which the king of Judæa appeared to be represented among the prisoners or trophies of Sheshonk. Such is the credulity with which they have trusted to the good faith of every thing found on the monuments; and such is the scepticism with which they have received the simplest statements of Scripture, and the plainest inferences from Scripture: among which this

[b] 2 Chron. xii. 9. [c] 1 Kings xiv. 26.
[d] Wiseman, Lecture ix. 153–157.

is one, that though Shishak stript Jerusalem entirely of all its treasures, he carried away none of its people, much less the king of Judah.

We should be altogether of opinion, from the singular circumstance of the coincidence of this invasion with the deification of the Apis in Egypt, with the institution of the Apis cycle, and consequently with the foundation of Memphis; and from the implied object of the invasion itself, as it may be collected from the Scriptural account of its effect; that the sole motive which actuated Shishak was a desire to get possession of the treasures of Solomon: not simply however on their own account; but in order to enable him to complete the design which he had formed, and in part had begun to carry into execution, of founding a city at the head of the Delta[e], and in the heart of Egypt, which he intended to be the capital of that country, and proposed to raise at once to a pitch of greatness and splendour, which should make it the rival of Thebes or of Nineveh, at this time the two principal cities in the world. It pleased God that, as a just punishment for the infidelity of his own people, he should succeed in this object—that he should get possession of these treasures, and should carry them all away. Of the probable amount of those treasures perhaps no adequate idea can ever be conceived at present: and certainly not by those who read this part of the history of Scripture, relating to the reign of Solomon, in the same spirit of scepticism in which they read every thing else of an extraordinary kind. But it was well known to his contemporaries; and in particular to the Egyptians his nearest neighbours: and it was more than sufficient to inflame the cupidity of an unprincipled and unscrupulous aggressor, like Shishak, who wanted the means of carrying into effect those schemes of ambition, vainglory, and aggrandisement which nothing but such treasures as these could enable him to execute.

It is peculiar to this Egyptian king to be the first of the kings of that country who appears in Scripture under a proper name; and not under the name of Pharaoh: which was not so much the proper name of any one of the ancient kings of Egypt, as a general designation of those kings in common; derived from some supposed relation of them all

[e] Strabo, xvii. i: Pliny, H. N. v. 9: cf. xii. 30: xxxvi. 16.

in common to the sun. For Pharaoh (in Hebrew Pheraë, and in the Egyptian pronounced Phra or Phre) is explained to mean "the sun," as if compounded of the definite article Pi or Phi, and Ra, the sun[f]. The king who was the contemporary of Solomon, and whose daughter he married, is called in Scripture simply Pharaoh; though Eupolemus and Alexander Polyhistor[g] give him the name of Vaphres. It is very probable that Shishak did not belong to the ancient Pharaonic race of the kings; and that, had the truth been made known on this point, it would have been found that a change of dynasty took place in Egypt, before the close of the reign of Solomon, which placed Shishak on the throne. To judge from the names of his followers, on the occasion when he invaded Judæa, he might have been an Æthiopian. His army at least was composed of Lubims, Sukkiims, and Ethiopians[h]: the same in general, who are afterwards specified as composing the host of Zerah the Ethiopian, when he also invaded Judæa in the reign of Asa[i].

Be this as it may; if Shishak was king of Egypt *de facto* at this very time, and had actually conceived the design of founding such a city as Memphis, to be the capital of all Egypt; it is evident that this was a design which the priests of Lower Egypt were likely to fall in with, and to promote by every means in their power. And as the deification of the Apis, and the institution of its cycle, and the foundation of Memphis itself, are all proved by the event to have coincided, and to have fallen out critically at the same point of time; it is manifest that they must have concurred in the design, and must have done their best to promote it: for whosoever was the founder of Memphis, the deification of the Apis and the institution of the Apis cycle must have been the doing of the priests. It is exceedingly probable that in order to flatter Shishak, and to make him believe that the design which he had conceived had the approbation of Osiris himself, they invented the fable of the Apis at this

[f] Sir Gardiner Wilkinson, First series, i. ii. 43: Second series, i. xiii. 287, 288: cf. Josephus, Ant. Jud. viii. vi. 2. In our opinion however the true etymon of this name is the article Phi and the ancient Ara, *king*; see supra, p. 315. So that its proper meaning was simply "the king." In this sense Ra, as applied to the sun, was simply the king also, see vol. iii. 98.

[g] Eusebius, Præp. Evang. ix. 30. § 1. 423: 31. 425: 32. 426: 34. § 17. 432.

[h] 2 Chron. xii. 3.

[i] xiv. 9: cf. xvi. 8.

very time, on purpose; as if of an incarnation and manifestation of Osiris in the person of this new bull, expressly to do honour to the city which Shishak was founding, to make it his own, to adopt it and take it under his special patronage and protection: so that from this time forward the Apis, as the type and representative of Osiris, should be as exclusively the tutelary genius of Memphis as the Mneuis had been until then of Heliopolis. We should thus account, in the most natural and consistent manner, for the simultaneous rise of three such remarkable things, as the Apis, the Apis cycle, and Memphis, in the sense of the Menofri or Abode of Good; and each in a determinate relation to the other from the first.

We may conclude therefore with almost absolute certainty, that the true founder of Memphis must have been Shishak: and we may also conclude that the treasures of Solomon had much to do, if not with the first formation of the design of the foundation, yet with its execution and its completion: that the spoils of Jerusalem laid the foundation of the greatness of Memphis. And if the truth must be spoken, in spite of the prejudices and in spite of the scepticism and in spite of the ignorance and in spite of the dogmatism of our own day, we may go even further than this, and boldly venture to say that the treasures of Solomon and the spoils of Jerusalem had very probably much to do with a still greater work than that of the foundation and aggrandizement of Memphis. The Pyramids of Egypt, those stupendous buildings which have astonished all ages by their greatness, their solidity, their indestructibility, are close by Memphis: and Memphis itself, in the hieroglyphical style of its titles, is the land of the Pyramids[g]. Was Memphis then older than the Pyramids? or the Pyramids than Memphis? Did the Pyramids give that title to Memphis because it was built after them, and in their vicinity, or because the Pyramids were built after Memphis, and in its vicinity? We are content to declare our own opinion; which our readers may accept or not, as they think best: and that is simply this, That setting aside the authority of the monuments and dynasties,

[g] Sir Gardiner Wilkinson, Second series, iii. x. 278 note. Cf. Pliny, H. N. xxxvi. 16 1. Strabo, xvii. i. Diodorus, i. 63, 64.

which is utterly worthless in an historical point of view, we know of no testimony that would make the oldest of the Pyramids itself a thousand years old at the birth of our Saviour[h]: older in short than Shishak, and his immediate successors. The silence of Homer is just as conclusive against the existence of the Pyramids in his time, or against his own knowledge of their existence, as against the existence of Memphis, or the fact of its being known to him. Meanwhile the gigantic, colossal, and almost superhuman magnitude of such buildings as these, the sums of money which must have been expended upon them, and yet their total uselessness in an œconomical point of view, are very good arguments that the means which constructed such buildings were not derived from the resources of Egypt. Egypt did not impoverish itself for mere shew and ostentation. *De alieno facilis est largitio.* There would be little scruple in spending the treasures of Solomon even on the Pyramids. The Pyramids, built with the spoils of Jerusalem, might have reconciled Egypt even to the disgrace of the Exodus*.

* It may be inferred from Scripture[a] that the oldest settlement in Egypt must have been Zoan: though not older than Hebron in Canaan, built seven years before Zoan in Egypt. In the Septuagint Zoan is Tanis[b]: and Tanis is recognised by Strabo as the principal city of the Tanite nome: Καὶ ὁ Τανίτης νομὸς καὶ πόλις ἐν αὐτῇ μεγάλη Τάνις[c]: which gave name too to the Tanitic branch of the Nile. According to sir G. Wilkinson its modern name is San[d]: and it appears to have been situated in a plain or field, a few miles from the shore of the sea; where its ruins are still to be traced. Hence probably Egypt itself is styled in Scripture "the field of Zoan[e];" and in Isaiah[f] Zoan is joined with Noph or Memphis, and in Ezekiel[g] with No or Thebes or Diospolis also, the two principal cities at those times: probably because, though inferior in size and importance to either of them, it was nevertheless older than both.

The first mention of On in Scripture is in the history of Joseph[h]: but it might be a doubtful point at first sight whether On stood there for the name of the city, or for that of the sun. Josephus shews that he understood it of the city so called[i]: and so did Philo Judæus: Ὢν ἡ ἐστιν Ἡλίου πόλις[k]: though he explains Ὢν to mean properly Βουνὸς, and sym-

h Diodorus, i. 63, 64.

a Numb. xiii. 22.

b Cf. Isa. xxx. 4.

c xvii. i. Cf. Ptolemy, Geog. iv. cap. v. § 52.

d Manners and Customs, first series, i. ch. i. 5.

e Ps. lxxviii. 12. 43.

f xix. 11. 13: cf. xxx. 4.

g xxx. 13–16.

h Gen. xli. 45.

i Ant. Jud. ii. vi. 1.

k i. 236. 2: cf. 15, 16. De Posteritate Caini.

bolically ὁ νοῦς· Ἡ δὲ Ὢν καλεῖται μὲν βουνός· ἔστι δὲ συμβολικῶς ὁ νοῦς[l]— Καὶ τὴν Ὢν τὸν νοῦν ἣν Ἡλίου πόλιν ὠνόμασαν[m]. We are told by Strabo[n] that Heliopolis was actually situated ἐπὶ χώματος ἀξιολόγου: an artificial mound or embankment of considerable size. By the Septuagint also Ὢν in this instance is rendered Ἡλίου πόλις: so that we might justly conclude from these concurrent testimonies that Heliopolis, as the same with On, must have been older in Egypt than the time of Joseph; even though that fact were not placed out of all question by the date of the Phœnix cycle, which is sixty years older at least than the date of the elevation of Joseph to be the governor of Egypt. That cycle was connected with Heliopolis from the first; and Heliopolis must have been even older than that cycle. It could not at least have been younger. In one instance, in Jeremiah[o], On or Heliopolis appears to be designated Beth-shemesh; which would be the literal version in the Hebrew of Ἡλίου πόλις, "the house" or "city of the sun;" and in Ezekiel, xxx. 17, Aven is rendered in the ο′ by Ἡλιουπόλεως too.

It may be collected from Josephus, Contra Apionem[p], that according to the tradition of the Egyptians themselves, (a tradition recognised by both Manetho and Apio,) Moses himself was a native of Heliopolis or On; and according to Manetho in particular, he was a priest of Heliopolis, whose original name he pretended was Ὀσαρσὶφ or Ὀσάρσιφος (probably from some supposed reference to Osiris). It would follow from this fact that Heliopolis must have been the scene of the events preliminary to the Exodus; and the residence of Pharaoh's court at the time: consequently the principal city of Egypt still at that time. It follows too that the allusions, which occur in the history of the Exodus to "the city" absolutely[q], are to be understood of Heliopolis. And indeed, according to the tradition reported by Artapanus[r] on the authority of the people of Heliopolis themselves, the king who went in pursuit of the Israelites, and perished in the Red Sea, set out from Heliopolis. And though he certainly supposes Memphis to have been already in existence even before the flight of Moses to Midian, and the Apis to have been already consecrated there by a king whom he calls Chenephres[s], contemporary with the early part of the life of Moses; he speaks of Heliopolis notwithstanding as still the capital city of Egypt at this very time[t].

It is an argument of the antiquity of this city that it was consecrated to the sun, and derived its name from that relation. Diodorus tells us it was founded by Actis, son of Helius[u], which is much the same thing as saying it was as old as the sun's light: for Actis is the Greek for a sunbeam: and Stephanus Byz. repeats the statement[x]: Ἡλιούπολις, πόλις Αἰγύπτου,

l i. 236. 12.
m i. 632. 33. Quod a Deo mittantur somnia: cf. ii. 58. l. 39. De Josepho.
n xvii. 1.
o xliii. 13.
p i. 26: ii. 2.
q Exod. x. 29. 33: cf. viii. 29. 30: x. 18.
r Apud Eusebium, Præp. Evang. ix. 27. § 35. 403.
s Ibid. § 3. 395: 12. 396. 398. 17.
t Ibid. cap. 23. § 3, 4. p. 391: 27. § 2. 395. § 8. 396.
u v. 67, cf. 56.
x In voce.

ἣν ἔκτισεν Ἀκτὶς ὁ Ἡλίου καὶ Ῥόδου. Sol (tertius) says Cicero[y], Vulcano (natus,) Nili filio: cujus urbem Ægyptii volunt esse eam quæ Heliopolis appellatur. There was no god worshipped in Egypt before the sun: and the oldest city of Egypt, among all which were dedicated to particular divinities, must have been that which was sacred to the sun, and bore the name of the sun. In comparison of the Ra and the Mneuis of Heliopolis, both the Ammon of Diospolis and the Apis of Memphis were of recent date. Heliopolis or Balbec in Syria (Cœle Syria) too[z] professed to derive both its name and the object of its worship from the Heliopolis of Egypt; and yet the calendar of that city was much older even than the Apis cycle of Memphis, much more than the Julian calendar of Diospolis or Thebes. Nothing however proves more incontestably the superior antiquity of this one city to that both of Thebes and of Memphis, and in particular to that of the latter, than the Phœnix cycle. Is it credible that Memphis could have been in existence, when that cycle was instituted, and could have been the capital of the Delta, and within fifteen Roman miles of Heliopolis itself[a]; and yet both the fable of the Phœnix, and the meridian of the cycle, have been exclusively adapted to Heliopolis?

The Egyptians themselves admitted that Heliopolis was one of the cities founded by the ἀρχαῖοι θεοί[b]: and in the order in which these are enumerated by Diodorus, (Diospolis, Heliopolis, Hermupolis, Apollinopolis, Panopolis, Ilithuiopolis,) it was the second. The truth is, whatsoever city, whether Thebes or Memphis, challenged the palm of antiquity as its exclusive right, all were willing to concede the second place to Heliopolis; just as the Greek chiefs, after Salamis, each of whom claimed the ἀριστεῖα or πρωτεῖα as his own, were all willing to concede the δευτερεῖα to Themistocles; an admission which, in the opinion of impartial judges, very plainly implied that he in reality had the best right to the prize itself. In the reign of Sesoösis the younger, it is still recognised as the principal city[c]. The supreme court of judicature among the Egyptians consisted of 30 members, chosen from these three cities, Heliopolis, Thebes, and Memphis, ten from each[d]: wherein precedence, we see, was given to Heliopolis; and we may presume deliberately so: for Herodotus also tells us the people of that city were esteemed the most learned of the Egyptians: Οἱ γὰρ Ἡλιουπολῖται λέγονται Αἰγυπτίων εἶναι λογιώτατοι[e]. It is agreed at least that the most illustrious as well as the oldest school of philosophy and science, and especially of astronomy, was that of Heliopolis; vestiges of which, as we have seen, were still remaining in Strabo's time. It is incontestable that all strangers, attracted to Egypt by the desire of knowledge, resorted to Heliopolis; and if the name of the master or instructor of any of them, (especially among the Greeks, Pythagoras, Solon, Plato, Eudoxus,) has been left on record, he is seen to have been an Heliopolite[f].

[y] De Natura Deorum, iii. 21. § 54.
[z] Macrobius, Saturnalia, i. xxiii. 320.
[a] Cf. Josephus, De Bello, vii. x. 3.
[b] Diodorus, i. 12.
[c] Ibid. i. 59. cf. Herod. ii. 111.
[d] Ibid. i. 75. cf. 96.
[e] ii. 3.
[f] See supra, p. 128.

As the sun was the first object of adoration which mankind proposed to themselves, as soon as they began to substitute any created object in that capacity for the Creator himself, God blessed for ever! so the first and earliest mode which they adopted of typifying or representing the sun, as such an object of worship, was by means of pillars, pointed so as to have the shape of cones; obelisks, and pyramids: especially of the obelisk, which took precedence at first even of the pyramid. We read of stupendous structures, in the form of obelisks, erected at Nineveh or Ninus, and at Babylon: but of none any where either greater or older of their kind than those which the Egyptians erected at Heliopolis. Herodotus speaks of the obelisks in the temple of the sun at Heliopolis, as the work of Pheros, the son of Sesostris[g]: in which designation Pheros appears to be only the scriptural name for the kings of Egypt, the Pharaohs in general; and the true meaning of the statement very probably is that these obelisks were the work of the ancient line of kings, the Pharaohs of antiquity; of whom Sesostris himself was only one, though the most illustrious. There is in Pliny an account of many structures of this kind, supposed to have been built and dedicated to the sun, by these ancient kings, yet only in Heliopolis[h]: by Mestes or Mestres, by Sothis, by Ramises, (contemporary with Troja Capta,) by Smarris, and by Eraphius: in the time of all of whom consequently, if they ever had a real existence, Heliopolis must still have been the principal city. Of these, Mestres may be a corruption of the Scriptural name of Mesre or Mezraim: Sothis is the dog-star: Ramises is a name as old as the Exodus: Smarris and Eraphius, so far as we know, no where occur, unless the former be a corruption of Mœris.

Of Ramises or Rameses in particular he observes[i]: Idem digressus inde, ubi fuit Mneuidis regia posuit aliam .... hac admiratione operis effectum est, ut quum oppidum id (Heliopolim) expugnaret Cambyses rex, ventumque esset incendio ad crepidines obelisci, exstingui ignem juberet, molis reverentia qui urbis nullam habuerat. Compare with this Strabo's account of Heliopolis in his own time[k]: *Νυνὶ μὲν οὖν πανέρημος ἡ πόλις τὸ ἱερὸν ἔχουσα Αἰγυπτίῳ τρόπῳ κατεσκευασμένον ἀρχαῖον, ἔχον πολλὰ τεκμήρια τῆς Καμβύσου μανίας καὶ ἱεροσυλίας, ὃς τὰ μὲν πυρὶ τὰ δὲ σιδήρῳ διελωβᾶτο τῶν ἱερῶν, ἀκρωτηριάζων καὶ περικαίων, καθάπερ καὶ τοὺς ὀβελίσκους· ὧν δύο καὶ εἰς Ῥώμην ἐκομίσθησαν οἱ μὴ κεκακωμένοι τελέως· ἄλλοι δ' εἰσὶ κἀκεῖ κἂν Θήβαις τῇ νῦν Διοσπόλει, οἱ μὲν ἑστῶτες ἀκμὴν πυρίβρωτοι, οἱ δὲ καὶ κείμενοι.*

On this allusion to these obelisks, as brought from Egypt to Rome, much light is thrown, not only by Pliny[l] and others[m], but also by Ammianus Marcellinus, speaking of A. D. 357[n], and of Constantius' visit to Rome at that time. It appears both from him and from Pliny that two obelisks were brought from Egypt in the reign of Augustus, and were dedicated, one in the Circus Maximus, the other in the Campus Martius. The

g ii. 111.
h H. N. xxxvi. 14. § 1. 3. 4.
i Ibid. §. 4.
k xvii. i.
l H. N. xxxvi. 14. § 3. 4 5: 15. p. 667.
m Cf. Servius, ad Æneid. iii. 444.
n xvii. 4. Cf. xvi. 10. p. 100.

former is described by Tertullian [o] among the other component parts of the circus in his time: Obelisci enormitas, ut Hermoteles adfirmat soli prostituta, scriptura ejus unde et census. de Ægypto superstitio est: that is, it was full of hieroglyphics, the writing of the country from which it came. There was a third, which Augustus had not ventured to disturb; principally, according to Ammianus, because it had been dedicated *to* the sun, and *in* the temple of the sun, *at* Heliopolis: Fixusque intra ambitiosi templi delubra, quæ contingi non poterant, tamquam apex omnium eminebat.

Yet this too Ammianus here describes as recens advectum; i. e. it had been removed from Heliopolis to Alexandria, in the life-time of Constantine, in order to be conveyed to Rome: but Constantine dying meanwhile, it had still lain at Alexandria, until a short time before this visit of Constantius to Rome [oo]; by which time it had been transported from the Nile to the Tyber, and landed in the Vicus Alexandri, three miles from Rome. Inde chamulcis impositus, tractusque lenius, per Ostiensem portam piscinamque publicam circo illatus est maximo. And here it was ordered by Constantius to be erected, A. D. 357, as we apprehend; and here accordingly it was at last set up.

Four other obelisks were afterwards brought from Egypt to Rome (between A. D. 357 we must suppose, and A. D. 378, the close of the history of Ammianus,) and set up one in the Vatican, one in the gardens of Sallust, and two in the monument of Augustus: Qui autem notarum textus, he observes, obelisco incisus est veteri (the first of all) quem videmus in circo, Hermapionis librum secuti, interpretatum litteris subjecimus Græcis. Six of these inscriptions follow. No city is mentioned in any of them but Heliopolis; no god but the sun, Apollo, Ares or Mars, Ammon and Vulcan. No king but Ramestes or Rameses; of whom it is said in the first, Ὧι πᾶσα ὑποτέτακται ἡ γῆ μετὰ ἀλκῆς καὶ θάρσους: and in the third, Ὃς ἐφύλαξεν Αἴγυπτον τοὺς ἀλλοεθνεῖς νικήσας—and, Πληρώσας τὸν νεὼν τοῦ Φοίνικος ἀγαθῶν κ', τ. λ.: from which allusions some idea may be formed of the age of the inscription itself: but we must not suppose from the mention of the Phœnix that it could be as old as the Phœnix cycle. The in-

[o] iv. 117. De Spectaculis, 8.

[oo] The visit of Constantius to Rome, referred to by Ammianus in this passage, xvi. 10, seems to be proleptically mentioned. At least if we compare xvi. 10 with xv. 8 (which belongs to A. D. 355 cir. Nov. 6) we shall see that Helene was married to Julian about that time, (just after he was declared Cæsar, Nov. 6.) Yet (xvi. 10) she had already a son born, in Gaul, before she came to Rome, on this occasion, while Constantius and Eusebia were still there. Her child could not have been born before August A. D. 356. Constantius was at Rome *one* month, and left it iv. kal. Junias, May 29. Consequently he must have come thither, April 29. If Helene then was there while he too was still there, yet after the birth of her child, it must have been in A. D. 357 not in 356. The year A. D. 357 therefore, in Ammianus, must begin xvi. 10, not xvi. 11. Cf. xvi. 1, which opens on the kalends of January, A.D. 356; and xvi. 2, which mentions viii kal. Jul. (June 24) the same year; and xvi. 9, the winter of the same year; all before this visit of Constantius to Rome; which, if related in its proper order, would thus be determined only to April 29 A. D. 357 at the earliest.

SECTION III.—*On the Io and Epaphus of Grecian mythology. Testimonies.*

i. Ἔστιν πόλις Κάνωβος ἐσχάτη χθονὸς,
Νείλου πρὸς αὐτῷ στόματι καὶ προσχώματι·
ἐνταῦθα δή σε Ζεὺς τίθησιν ἔμφρονα
ἐπαφῶν ἀταρβεῖ χειρὶ καὶ θιγὼν μόνον.
ἐπώνυμον δὲ τῶν Διὸς γεννημάτων
τέξεις κελαινὸν Ἔπαφον, ὃς καρπώσεται
ὅσην πλατύρρους Νεῖλος ἀρδεύει χθόνα [h].

Ἔπαφος, ἀληθῶς ῥυσίων ἐπώνυμος [i].

Νῦν δ' ἐπικεκλόμεναι
Δῖον πόρτιν ὑπερ-
πόντιον τιμάορ' Ἶνίν τ'
ἀνθονομούσας προγόνου
βοὸς ἐξ ἐπιπνοίας
Ζηνὸς, ἔφαψιν ἐπωνυμίᾳ δ'
ἐπεκραίνετο μόρσιμος αἰὼν,
εὐλόγως Ἔπαφόν τ' ἐγέννασεν [k].

ii. Ὁ δὲ Ἆπις κατὰ τὴν Ἑλλήνων γλῶσσάν ἐστι Ἔπαφος [l]—Τὸν Ἕλληνες Ἔπαφον καλέουσι [m]—Ὁ δὲ Ἆπις οὗτος ὁ Ἔπαφος [n]—Τοὺς δὲ βοῦς τοὺς ἔρσενας τοῦ Ἐπάφου εἶναι νομίζουσι, καὶ τούτου εἵνεκα δοκιμάζουσι αὐτοὺς ὧδε κ. τ. λ.[o]

scription at least could not be older than Phthas and Ammon, which it mentions also; nor than Rameses himself, though a mere monumental king, who never had an historical existence.

To return however from this digression. It is entirely consistent with our conclusion concerning the true age of Memphis, that no allusion to Memphis by name is to be met with in Scripture, for 200 years or more after the date of its foundation, B. C. 973. The Scriptural name of Memphis is Noph (probably an abbreviation of the Egyptian Me-nof-ri or Menof.) Wherever this name occurs in the Old Testament, the Septuagint render it by Memphis: our version sometimes by Memphis, sometimes by Noph. The earliest mention of it by this name is Hosea ix. 6, or Isaiah xix. 13; according as Hosea or Isaiah was the older prophet. It occurs also in Jeremiah [p], and in Ezekiel [q].

p xliv. 1: [In the ο' Noph or Memphis here is omitted.] xlvi. 14.

q xxx. 13. 16. In the ο' Noph or Μέμφις appears to have been read in v. 15 for No (or Διόσπολις), and in v. 16, No (Διόσπολις) for Noph (Μέμφις). The earliest mention of Memphis in any classical writer of antiquity, next to Æschylus, seems to be in a fragment of Bacchylides, preserved by Athenæus, i. 36:

Περὶ ἧς Βακχυλίδης φησὶ
Τὴν ἀχείμαντόν τε Μέμφιν καὶ δονακώδεα Νεῖλον.

h Æschylus, Prometheus, 846.

i Ibid. Supplices, 314. k Ibid. 41.

l Herodot. ii. 153. m Ibid. iii. 27.

n Ibid. iii. 28. o Ibid. ii. 38.

iii. *Φάμι γὰρ τᾶσδ' ἐξ ἁλιπλάγ-*
κτου ποτὲ γᾶς 'Επάφοιο κόραν
ἀστῶν ῥίζαν φυτεύ-
σεσθαι [p].

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iv. Hoc alii signum Phariam dixere juvencam,
Quæ bos ex homine est ex bove facta dea [q].

Nunc dea linigera colitur celeberrima turba.
Hinc Epaphus magni genitus de sanguine tandem
Creditur esse Jovis, perque urbes juncta parenti
Templa tenet [r].

Visite turicremas vaccæ Memphitidos aras,
Visite conspicuis terna theatra locis [s].

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v. Hæc procul Io
Spectat ab arce poli, jam divis addita jamque
Aspide cincta comas et ovanti persona sistro [t].

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vi. *'Ιναχίης ἕστηκεν ἐν "Ισιδος ἡ Θάλεω παῖς*
Αἰσχυλὶς Εἰρήνης μητρὸς ὑποσχεσίῃ [u].

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vii. Io....ubi parit Epaphum. Jovis (Jupiter).... formam suam ei propriam restituit, deamque Ægyptiorum esse fecit quæ Isis nuncupatur [w].

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viii. *"Ηλθε καὶ εἰς Αἴγυπτον ἐμὸν ῥόον, ὃν πολιῆται*
Νεῖλον ἐφημίξαντο φερώνυμον, οὕνεκα γαίῃ
εἰς ἔτος ἐξ ἔτεος πεφορημένος ὑγρὸς ἀκοίτης
χεύματι πηλώεντι νέην περιβάλλεται ἰλυν.—
"Ηλυθεν εἰς Αἴγυπτον, ὅπη βοέην μετὰ μορφὴν
δαιμονίης ἴνδαλμα μεταλλάξασα κεραίης

p Pindar, Pythia, iv. 24. This daughter of Epaphus is meant of Libya, see ver. 75. 462; and cf. the Scholia ad Æschylum, Prom. Vinctus, 774: *Τρίτος δὲ γένναν, κ', τ. λ*: and 853, *Πέμπτη δ' ἀπ' αὐτοῦ κ', τ. λ*: also ad Supplices, 317=319. Also the Scholia on the Orestes of Euripides, ver. 920=930, 1239=1246: and on the Phœnissæ, 181: 247: 291.

In all these cases, the line of descent is supposed to be, Io, Epaphus, Libya, Belus, Danaus, and so on. Cf. also the Scholia on the Timæus of Plato, 17. 14, Opp. ii. 426: Libya so called, *'Απὸ Λιβύης τῆς 'Επάφου βασιλέως Αἰγύπτου, καὶ Μέμφεως τῆς Νείλου.* And Hyginus, Fabb. cxlvi. cxlix. cclxxv, who calls the name of the wife of Epaphus (the mother of Libya) Cassiopea.

q Ovid, Fasti, v. 619, of the constellation Taurus.

r Ibid. Metamorphoses, i. 747.

s Ibid. De Arte Amandi, iii. 393. Cf. 635.

t Valerius Flaccus, Argonautica, iv. 416.

u Anthologia, i. 218. Callimachus, xxv.

w Hyginus, Fabulæ, cxlv. Cf. Servius, ad Georgica, iii. 152. Æneid, vii. 790. Philargyrius, ad Georgica, iii. 153. Lactantius, i. xi. 59. Isidore, Origines, i. 3. p. 1. F.: iii. 21. 27. C.: viii. 11. 71. G.

ἔσκε θεὰ φερέκαρπος· ἀναπτομένοιο δὲ καρποῦ
Αἰγυπτίης Δήμητρος ἐμῆς περικαλλέος Ἰοῦς
εὐόδμοις ὁμόφοιτος ἑλίσσεται ἄτμος ἀήταις·
ἔνθ' Ἔπαφον Διῒ τίκτε [x].

Συλήθης φερέκαρπε, παρὰ σταχυώδεϊ Νείλῳ
ἀντὶ τεῆς Δήμητρος ἀμαλλοτόκοιο τεκούσης
ἄλλῃ κῶμον ἄγουσι· νόθη δέ τις ὄμπνια Δηὼ
ταυροφυὴς κερόεσσα φατίζεται Ἰναχὶς Ἰώ [y].

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ix. Τριόπας δὲ συγχρονεῖ Ἴσιδι, ἑβδόμῃ γενεᾷ ἀπὸ Ἰνάχου...... Ἶσιν δὲ τὴν καὶ Ἰώ φασι, διὰ τὸ ἰέναι αὐτὴν διὰ πάσης τῆς γῆς πλανωμένην....Ταύτην δὲ Ἴστρος.... Προμηθέως θυγατέρα φησὶ, Προμηθεὺς δὲ κατὰ Τριόπαν, ἑβδόμῃ γενεᾷ μετὰ Μωϋσέα... Λέων δὲ...τὴν Ἶσιν ὑπὸ Ἑλλήνων Δήμητρα καλεῖσθαί φησιν· ἣ (sc. Δημήτηρ) κατὰ Λυγκέα γίνεται, ἑνδεκάτῃ ὕστερον Μωϋσέως γενεᾷ [z].

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x. Ἶσις. Δαίμονός ἐστιν ὄνομα τιμωμένης παρὰ Αἰγυπτίοις.... ἡ αὐτὴ γάρ ἐστι τῇ γῇ....ἄλλοι δὲ λέγουσιν (ὅτι) αὕτη ἐστὶν ἡ Ἰώ [a].

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xi. Τελευταῖον ἧκεν εἰς Αἴγυπτον ὅπου τὴν ἀρχαίαν μορφὴν ἀπολαβοῦσα γεννᾷ παρὰ τῷ Νείλῳ ποταμῷ Ἔπαφον παῖδα. τοῦτον δὲ Ἥρα δεῖται Κουρήτων ἀφανῆ ποιῆσαι· οἱ δὲ ἠφάνισαν αὐτόν. καὶ Ζεὺς μὲν αἰσθόμενος κτείνει Κούρητας· Ἰὼ δὲ ἐπὶ ζήτησιν τοῦ παιδὸς ἐτράπετο. πλανωμένη δὲ κατὰ Συρίαν ἅπασαν [b], (ἐκεῖ γὰρ ἐμηνεύετο ὡς τοῦ Βυβλίων βασιλέως γυνὴ ἐτιθήνει τὸν υἱὸν,) καὶ τὸν Ἔπαφον εὑροῦσα, εἰς Αἴγυπτον ἐλθοῦσα ἐγαμήθη Τηλεγόνῳ τῷ βασιλεύοντι τότε Αἰγυπτίων. ἱδρύσατο δὲ ἄγαλμα Δήμητρος ἣν ἐκάλεσαν Ἶσιν Αἰγύπτιοι, καὶ τὴν Ἰὼ Ἶσιν ὁμοίως προσηγόρευσαν [c] —Ἔπαφος δὲ βασιλεύων Αἰγυπτίων γαμεῖ Μέμφιν Νείλου θυγατέρα, καὶ ἀπὸ ταύτης κτίζει Μέμφιν πόλιν, καὶ τεκνοῖ θυγατέρα Λιβύην, ἀφ' ἧς ἡ χώρα Λιβύη ἐκλήθη [d].

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xii. Ad ann. 161. Inachi filia Io: quam Ægyptii mutato nomine Isidem colunt [e]—Io...secundum nonnullos in Ægyptum profecta Isis nuncupata; quæ nupta postea Telegono

[x] Nonnus, Dionysiaca, iii. 275. Cf. 258 sqq.
[y] Ibid. xxxi. 37.
[z] Clemens Alexandrinus, Strom. i. xxi. § 106. p. 75. l. 1. Conf. i. xvi. § 75. p. 53. l. 23. Diodorus Sic. i. 24.
[a] Etym. Magnum, 432. Suidas, Ἰώ. Hesychius.
[b] Cf. Libanius, Λόγος Ἀντιοχικός.
[c] Apollodorus, Bibliotheca, ii. i. § 3.
[d] Ibid. § 4. Cf. supra, p. 454 note.
[e] Eusebius Chron. Arm. Lat. Cf. Thsaurus Temporum, ad ann. 160.

Epaphum genuit[f]—Memphis in Ægypto ab Ape conditur[g]—Epaphus filius Ionis Memphim condidit[h].

SECTION IV.—*Observations on the preceding testimonies.*

Our object in producing these statements is not to enter on any critical examination of the Greek fable of Io; but to point out briefly its Egyptian origin, and its connection with the fable of Isis and with the fable of the Apis. It is clear from these testimonies that it was connected with both: that the Io of the Greeks was the same with the Isis of the Egyptians, and yet was the mother of Epaphus; and that Epaphus himself was the same with the Apis, and yet was the son of Io.

It is uniformly represented in the Greek fable of Io, that she was turned into a cow. There cannot be any doubt too that the Isis of the Egyptians was often represented in the form of a cow; and almost always with the head and horns of a cow. For this reason, according to Herodotus, cows were sacred to her in Egypt, and were not allowed to be sacrificed[i]: Ἀλλὰ ἱραί εἰσι τῆς Ἴσιος· τὸ γὰρ τῆς Ἴσιος ἄγαλμα ἐὸν γυναικήϊον βούκερών ἐστι κατάπερ Ἕλληνες τὴν Ἰοῦν γράφουσι[k]. Strabo speaks of the cow, sacred to the Egyptian Ἀφροδίτη, at Mo-Memphis[kk], and of the white cow, similarly consecrated to her, at Aphroditopolis[l]; Ælian of the cow of Venus Urania, as he styles her, at Chusæ in the Hermopolite nome[m]: and the monuments and sculptures, whether truly or not, that is, whether with any foundation for the connection in point of fact or not, yet connect the cow not only with Isis, but with Athor and Neith[n]; the former the Egyptian Venus, the latter the Egyptian Minerva, but both ultimately the same conception as Isis herself, and not to be distinguished from her except in name.

It may well be questioned however, whether the cow was the

f Thesaurus Temporum, ad ann. 481. cf. p. 55, Proœm. and Chron. Arm. Lat. i. 103, ad ann. 480: 105, ad ann. 498.

g Euseb. Chron. Arm. Lat. ad ann. 279. cf. Thesaurus Temporum.

h Thesaurus Temporum, ad ann. 525. cf. Euseb. Chron. Arm. Lat. ad ann. 529.

i Cf. Porphyry, De Abstinentia, ii. 11.

k Herodotus, ii. 41. cf. iv. 186. and Ælian, De Anim. x. 27.

kk xvii. 1.

l Cf. Wilkinson, Second series, i. xiii. 389, 390. ii. xiv. 194. See supra, p. 304.

m Historia Anim. x. 27.

n Sir Gardiner Wilkinson, Second series, i. xiii. 359. 382, 383. ii. xiii. 67, 68. Birch, Egyptian Ant. P. i. 19: 20: 12. Bunsen, B. i. sect. vi. A. vii. 385, 386. vi. B. v. 400–402.

recognised type of Isis from the first, any more than the bull that of Osiris: and not from the time only of the institution of the Apis cycle, and of the introduction of the worship of the Apis. The Egyptian for cow, we are told, is Ehe[o] or Ha; that for the moon is Ioh[p] Aah[p] or Aâh[q]. It is self-evident that the Grecian Ἰὼ, and the Egyptian Ioh for the moon, are absolutely the same; but not Ἰὼ, and Ehe the Egyptian for cow, (with the article, Te-he.) We could not hesitate therefore to infer that the Greek name of Io was much more probably derived from the Egyptian name for the moon, than from that for the cow; and consequently that the proper connection of Io at first was with the moon, not with the cow; or with the latter only through the former: and if so, that of Isis also. In fact, we meet with a statement in Eustathius, ad Dionysium Periegetem[r], which, if true, would make Io itself a word in the Argive dialect for the moon; though even in that case we could not doubt that it must have been brought to Argos from Egypt: *Λέγουσι δὲ τινες καὶ τὸ ἀπὸ Γάζης μέχρις Αἰγύπτου πέλαγος Ἰόνιον λέγεσθαι ὁμοίως ἀπὸ τῆς Ἰοῦς. καὶ τὴν ἐκεῖ δὲ Γάζαν Ἰόνην καλοῦσί τινες· ἔνθα βοῦς ἦν ἐν ἀγάλματι τῆς Ἰοῦς, ἤγουν τῆς σελήνης. Ἰὼ γὰρ ἡ σελήνη κατὰ τὴν τῶν Ἀργείων διάλεκτον.*

The Egyptian Isis was certainly associated with the moon, as Osiris was with the sun[s]. *Εἰσὶ γὰρ οἱ...τὴν δ' Ἶσιν οὐχ ἑτέραν τῆς σελήνης ἀποφαίνοντες, καὶ τῶν ἀγαλμάτων αὐτῆς τὰ μὲν κερασφόρα τοῦ μηνοειδοῦς γεγονέναι μιμήματα, τοῖς δὲ μελανοστόλοις ἐμφαίνεσθαι τὰς κρύψεις καὶ τοὺς περισκιασμούς*[t] *κ', τ. λ.* But she could not have been formally connected both with the moon and with the likeness of a cow before the invention of the fable of the Apis, and the institution of the Apis cycle: nor is there any reason to suppose that she was. The Grecian Io combined each of these relations from the first; the relation to the moon, as implied in her name, and that to the cow, as implied in the figure in which she was always represented. The Grecian conception of Io then could not

[o] Sir Gardiner Wilkinson, i. xiii. 388. ii. xiii. 67, 68. Bunsen, i. 461. Vocabulary, No. 148.

[p] Sir Gardiner Wilkinson, ii. xiii. 5. Egyptian Antiquities, part i. 26. Thoth: 31. Osiris.

[q] Chevalier Bunsen, i. 454. Vocabulary, No. 4.

[r] v. 94.

[s] See supra, Diss. xiv. ch. iii. sect. 2. vol. iii. 76.

[t] Plutarch, De Iside, lii.

be older than the Apis cycle; nor than the first recognition of Isis also in her double relation both to the moon and to the cow. And as there is no version of the Greek fable of Io, which does not make her recover her natural shape only in Egypt, and does not represent this recovery of her natural form as followed immediately by the birth of Epaphus; if Epaphus was really the Grecian name for the Egyptian Apis, this circumstance does more than any thing else to connect the Greek fable of Io with the Egyptian one of the Apis. It confirms the connection still further, that Epaphus, according to the same Greek version of the fable, was the founder of Memphis: the real explanation of all these representations being that the Apis and Memphis, that is, Epaphus and Memphis, came into being together.

These coincidences do strongly imply that the Hellenic fable of Io, taken as a whole, and including the history of Epaphus also, the supposed offspring of Io and the supposed founder of Memphis too, could not be older than the Apis cycle; and yet it is no less clearly implied by the fable itself that, so far as regards the character and conception of Io, there was little or no difference between her and Isis. The Io of this fable was the counterpart of the Egyptian Isis; the fortunes and wanderings of Io in this fable were those of the Egyptian Isis also: from which it would seem to follow that the first conception or first introduction of this fable among the Greeks must go as far back as the origin of the fable of Osiris and Isis itself among the Egyptians. It has been seen too[x] that according to the Greek fable, the Hermes or Mercury, the deliverer of Io from the custody of Argus, was the same, who having fled into Egypt, in consequence of the part which he had thus acted in behalf of Io, became known to the Egyptians under the name of Thoth; and gave that name as his own to the first of the months in their calendar: and this too, as we have also seen, would carry back the origin of the Grecian version of the fable as far as the institution of the Isia, and the epoch of the Sothiacal period.

If there is any appearance of inconsistency in the parts of the same story, one of which makes Io the same with Isis from the first, and the other, the mother of Epaphus, or of

[x] Supra, p. 184. Diss. xvii. ch. i. sect. v.

the Apis also, from the first; it is explained by the fact that, though the Greeks could know nothing of the Apis and of the Apis cycle before B.C. 973, and probably much later, yet they became very early acquainted with the name and character of Isis: which were communicated to them, as we are told by Herodotus, directly from Egypt; if it be true, as he informs us, that the daughters of Danaus taught the women of Argos the Egyptian rite of the Isia, which he calls the Thesmophoria. It is certain at least that only 44 years after the rise of the fable of Osiris and Isis in Egypt, and the institution of the Isia there, the same fable appears in Greece, in its proper Hellenic form; which is that of the story of Demeter and the Koré: accompanied too with a similar institution, signalised and perpetuated by a corresponding modification of the primitive calendar, in the Eleusinian correction of Eumolpus, and in the Thesmophorian one of Triptolemus; of both which, if it should be the will of God, we trust in due time to give a full account. It follows however from these facts that, whensoever and howsoever the Greeks first conceived the circumstances of the fable of their Io, they had an historical prototype for her, with which they had long been familiar, in the Egyptian Isis; and they had nothing to do but to graft the character of Io, even as the mother of Epaphus, on that.

With regard however to the proper Hellenic conception of this character of Io, in her relation to the moon, to the cow, and to Epaphus, and to Isis, all alike, it does not appear that it can lay claim to any great degree of antiquity. It is unknown both to Homer and to Hesiod; in neither of whom does the name of Io, or even that of Inachus, occur: and yet Hesiod was three hundred years younger than Homer. In short, we do not think it can be traced beyond the time of Æschylus; and Æschylus is comparatively a recent authority for it: and in his time both the fable of Osiris and Isis, and that of the Apis, might have become known to the Greeks, and might have been confounded too.

The principal use of this fable is to confirm by its testimony, as far as that is applicable, two very important conclusions, to which we have already attained; the true age of Isis, and the true age of Memphis. The fable identifies Io with

Isis, and therefore connects Isis with Inachus: which, though not strictly true, when the chronology of the Grecian Inachus is tested by that of the Sothiacal period, is the truth itself compared with the fabulous antiquity which the Egyptians themselves assign to their Isis. It recognises Epaphus, the son of Io, as the founder of Memphis; and therefore Memphis as no older than Epaphus: that is, than the Apis and the Apis cycle.

DISSERTATION XIX.

On the Alexandrine and on the Coptic calendar.

CHAPTER I.

On the Alexandrine calendar.

Section I.—*Derivation of the Alexandrine calendar from the equable Egyptian calendar.*

It is agreed that the Alexandrine calendar was a Julian calendar: but it is also agreed that the names and the order of the months in this calendar were the same with those of the Egyptian or equable. To demonstrate therefore the derivation of this Julian calendar from this equable one; nothing is necessary except to prove that the date of this Julian correction, which is known by the name of the Alexandrine, was Nabonassar 723, B. C. 26; and that the first of the equable Thoth Nabonassar 723, August 30 B. C. 26, was assumed as the epoch of this Alexandrine correction: and that will be proved if it can be shewn that as the date of this correction was Nab. 723, B. C. 26, so the epoch of the Julian calendar, which then first came into being, in the first year of its proper cycle of leap-year was always August 30.

We shall begin with the proof of this latter proposition first. It is probably well known to many of our readers that the proper Julian epoch of the Alexandrine calendar was always either August 29 or August 30; August 30 in the first year of its proper cycle of leap-year, August 29 in the other three: but it may not be so well known, that the first and original epoch of the calendar itself was August 30 not August 29. This is the point which we shall begin with establishing: and since it is necessary that we should proceed systematically, we will suppose the reader to be as yet unacquainted with the nature and administration of this Julian

Egyptian calendar, and to have them to learn from the testimonies which we shall produce.

SECTION II.—*On the proper Julian epoch of the Alexandrine calendar. Testimonies.*

i. The first of these testimonies is that of Macrobius: though Macrobius himself appears to have been a contemporary of Theodosius the Great [x], and consequently much later than the date of the correction. His testimony however is given only to the nature of this calendar in general, as a species of Julian calendar, consisting of 365 days in the common years of its proper cycle, and of 366 in the leap-years. Nor does it define its epoch in terms of the Julian calendar, further than by determining the seat of the intercalary day in the proper years of the cycle, between August and September in that calendar. Tunc Horus, Dies quidem hic, inquit, intercalaris antequam quintus annus incipiat inserendus, cum Ægypti matris artium ratione consentit. sed nihil in illorum mensibus explicandis videtur operosum, quia tricenûm dierum omnes habent; eo quod, explicitis duodecim mensibus id est trecentis sexaginta diebus exactis, tunc inter Augustum atque Septembrem reliquos quinque dies anno suo reddunt, adnectentes quarto quoque anno exacto intercalarem qui ex quadrantibus confit [y].

ii. Ptolemæus, De Apparentiis [z]: *Κεχρήμεθα δὲ τῇ καθ' ἡμᾶς τοῦ ἔτους χρονογραφίᾳ, δια* (supple *τὸ*), *τῆς κατὰ τὸ ἔτος ἐπουσίας ἐν ταῖς ἐμβολίμοις διὰ τετραετηρίδος ἡμέρας* (lege *ἡμέραις*) *ἀποδιδομένης, ἐπὶ πολὺν χρόνον δύνασθαι τὰς αὐτὰς φάσεις ταῖς ὁμωνύμοις ἡμέραις ὡς ἐπὶ πᾶν ἐκλαμβάνεσθαι.* It thus appears that the dates in the Apparentiæ, about to follow, were purposely to be given in terms of the Alexandrine calendar, because it took account of the excess of the mean Julian year over the equable of 365 days, here called the *ἐπουσία* or epact, once in four years; in the shape of an intercalary day. Consequently in a calendar of that description the dates of the celestial phenomena, about to be subjoined, would be found attached for a long time to the same days; i. e. until the excess of the mean sidereal year

[x] Saturnalia, i. ii. 105.
[y] Ibid. i. xv.
[z] Procemium, Opp. iii. Pars ii. p. 18.

over the mean Julian amounted to a day; or, as our own tables shew, for 150 or 160 years at least.

This Julian calendar of the Apparentiæ is dated on the first of Thoth: *Τῶν οὖν ἡμερῶν ἑκάστην ἀπὸ τῶν ἐν τῷ Θὼθ νουμηνιῶν ἐκτιθέμενοι κατὰ τὴν οἰκείαν τάξιν ὑπογράφομεν*[z]: and the first of Thoth itself is supposed to correspond to August 29; as appears from its own intimation[a], *Μὴν Θὼθ ἤτοι Σεπτέμβριος, καθ' ἡμᾶς δὲ* (the Greeks of Alexandria) *Αὐγούστου κθ'*. This is the earliest distinct statement to that effect, any where extant. It must of course be understood of the first of Thoth in the common years of the cycle of leap-year; and that being August 29, it is thereby implied that in the first year of the cycle it must be August 30. The date of this calendar of Ptolemy's, like that of his catalogue of the stars[aa], may be assumed as A. D. 138 or 140. It cannot be assumed as A. D 139: because in that year the first of the Alexandrine Thoth must have been Aug. 30.

iii. An inscription is extant in Gruter[b], in honour of the Pater or Principal of the Pæanistæ, an order of persons at Rome, devoted to the Egyptian Sarapis as the same with the Greek Pæan or Apollo: and this is dated *τῇ πρὸ α' νωνῶν Μαΐων*, Pridie nonas Maias, May 6 in the Roman style, *Κατὰ Ἀλεξανδρεῖς Παχὼν ια'*, Pachon 11 in the Alexandrine; in the consular year of Sextus Erucius Clarus II. Cn. Claudius Severus: which consuls appear in the Fasti U. C. 899 A. D. 146. If the 6th of the Roman May answered to the 11th of the Alexandrine Pachon; August 29 Roman must have corresponded to Thoth 1 at Alexandria.

iv. In the Epistle of Ambrose to the bishops of Æmilia[c], among other instances of the date of Easter Sunday, in terms both of the Alexandrine and of the Julian calendar, there specified, Pharmuthi 28 in the former, April 23 in the latter, æra Diocletiani 76, is one. This year of that æra bore date A. D. 359–360: whether on August 29 or August 30 depends on the date of Thoth 1 that year. Now A. D. 360, the Golden Number being xix and the Dominical Letters B. A. the date of Easter, according to the proper Alexandrine

z Procemium. Opp. iii. Pars ii. p. 18.

a Ibid. p. 21. 52. Cf. Uranologium, 71.

aa Vol. iii. 243. Diss. xv. ch. ii. sect. v.

b ccexiv. 2.

c Epp. xxiii. § 21. Opp. ii. 887.

rule, would necessarily be Sunday April 23. If this date corresponded to Pharmuthi 28, the first of Pharmuthi must have corresponded to March 27, and the first of Phamenoth to Feb. 26: from which, by reckoning back, we get to the first of Thoth æra Dioclet. 76, August 30 A. D. 359. It follows that this must have been the first year in the Alexandrine cycle of leap-year: and A. D. 360 being leap-year in the Julian cycle too, it would be discovered from these facts laid together, that the cycle of leap-year, proper to the Alexandrine calendar, anticipated six months on the cycle peculiar to the Julian: the former bearing date August 30 A. D. 359, the latter March 1 A. D. 360.

v. An ecliptic conjunction is calculated in the *Πρόχειροι κανόνες* of Theon, in the 80th year of the æra of Diocletian, and in the Alexandrine month Paüni: *Ἵνα δὲ καὶ ἐπὶ ὑποδείγματος φανερὰ ἡμῖν γένηται τὰ εἰρημένα, ὑποκείσθω ἐπιλογίσασθαι τόν τε τόπον καὶ χρόνον τῆς γενομένης συνόδου τῷ ὀγδοηκοστῷ ἔτει Διοκλητιανοῦ μηνὶ καθ' Ἕλληνας Παϋνὶ, ἐκλειπτικῆς τυγχανούσης*[d]. The calculation is given also in terms of the equable calendar; with which reference and relation we produced it ourselves on a former occasion[e]. This year of the æra corresponds to A. D. 363–364, dated from August 29 or August 30, according as Thoth 1 in that year fell on one or the other of those days. Theon assumes it also as equivalent to Philippi 687[f] (Nab. 1111); and it began in Nabon. 1111 Philippi 687, though it extended likewise into Nabon. 1112 Philippi 688.

A. D.			h.	m.		Nab.			h.	m.	
363	August	30	0	0	noon.	1111	Thoth	1	0	0	noon.
Add 9 months 21 days 2 h. 24 h.		291	2	24				291	2	24	
		321	2	24				292	2	24	
	Cast off	305					Cast off	270			
A. D.						Nab.					
364	June	16	2	24		1112	Paüni	22	2	24.	

This eclipse in Pingré, for the meridian of Alexandria, actually bears date June 16 2 h. 50 m. 10 s. P. M. A. D. 364. Its equable date was Thoth 24 2 h. 24 m. from noon; Nab. 1112 Phil. 688.

d Ptolemæi Opera, v. 77: cf. 31, 32.
e Vol. ii. 462. Diss. xii. ch. iv. sect. v. f P. 77.

From this example therefore it appears that A. D. 363 was the first year of the cycle of leap-year in the Alexandrine calendar; because the proper date of Thoth 1 that year was August 30, not August 29. This could not fail to be the case æra Dioclet. 80, if it was the case æra Dioclet. 76, only one cycle of leap-year before.

These examples are sufficient to establish both the proper cycle of leap-year in the Alexandrine calendar, in contradistinction to the Julian, and the proper date of the first of Thoth in each of the years of that cycle, in terms of the Julian calendar. The following scheme will shew both these things at once, assuming only that the proper date of the Julian cycle of leap-year is March 1; not the bissex in February: and that every month is to be reckoned at 30 days.

Julian cycle of leap-year.

year.		
i	5th of the viith month in the ist year of the Alexandrine ..	March 1
ii	in the iid	— 1
iii	.. iiid	— 1
iv	.. ivth.. ..	— 1

Alexandrine cycle of leap-year.

year.		
i	3d of the viith month in the ist year of the Julian	Aug. 30
ii	2d in the iid ..	Aug. 29
iii	2d .. iiid ..	— 29
iv	2d .. ivth ..	— 29

It follows that, as the date of the Epagomenæ in the Julian calendar on this principle would always be February 24, (the proper date of the vi kal. Martias in the Roman style, and repeated, that of the bissex also,) so the proper date of the Epagomenæ in the Alexandrine calendar must always have been August 24, in every year of their proper cycle of leap-year alike; and the stated date of their termination, in every year of the cycle but the last, must have been August 28: that is the date of the first Epagomene in the Alexandrine calendar, in every year of the cycle alike, must have been August 24; and that of the fifth, in every year alike, August 28: and in the leap-year of the cycle, in which there was a sixth Epagomene, its date must always have been August 29.

It would be easy to produce a variety of dates, in terms of the Alexandrine calendar, which occur in civil or in ecclesiastical writers; and are always to be referred to one or

other of these two epochs of August 29 or August 30, as corresponding to the Alexandrine Thoth 1 for the time being. But it is superfluous to multiply examples in proof of a point so certain as this. We shall conclude this part of our subject with some general testimonies to the nature of the Alexandrine calendar; taken from different authors, whose age falls between the fourth and the seventh or eighth century of the Christian æra.

i. There is a scholion in the Novi Canones Paschales of Isaac Argyrus, εἰς τὰς συνοδοπανσελήνους [i]; which must be much older than the time of Argyrus himself, since it recognises March 18 as the date of the entrance of the sun into Aries, that is, of the vernal equinox *; a date which appears first in our tables in A. D. 617 and last in A. D. 756. It describes the Alexandrine year as consisting of 12 months five days every common year, and 12 months six days every leap-year [k], in contradistinction to the equable or simple Egyptian year, which consisted of 365 only: and its epoch as August 29. In *our* leap-year, meaning the Julian, it observes, the Alexandrine epagomenæ are six in number: though it would have been more correct to have said, In the year before our leap-year. It proposes, by way of example [l], to determine the fifth of March in the current Julian year (which it appears from it was bissextile, and had a 29th of February,) in terms of the Alexandrine: but the reading of March 5th must be an error for March 6th, because it is determined to the 10th of Phamenoth, which could never correspond to any day but March 6th. If we reckon back from March 6th as the 10th of Phamenoth, in the first year of the Julian cycle of leap-year; we must necessarily come to August 30, as the 1st of Thoth in the year before.

ii. Maximus [m]: Σημειωτέον δὲ ὡς ὁ κατ' Αἰγυπτίους Θὼθ

* Page 2 and 12, the epoch of Argyrus' tables is fixed to A. M. 6876, which is considered to correspond to A. D. 1368. The vernal equinox at that time was falling on March 12. That A. D. 1368 corresponded to A. M. 6876 of this reckoning, see Ptolemy, iii. p. 7: extract from MS. 2394 of the royal library at Paris, where A. M. 6792 is supposed to correspond to A. D. 1284. The epoch of this æra in the Æra Vulgaris is A. M. 5508 = B. C. 1. dated from Sept. 1.

i Ptolemæi Opp. vii. p. 43. k 44. l 45, 46.
m Computus, xi. Uranologium, 351. A.

Σεπτέμβριος κατὰ Ῥωμαίους ἐστὶ, τὴν οἰκείαν ἀεὶ ποιούμενος ἀρχὴν ἤγουν νουμηνίαν κατὰ τὴν κθ' τοῦ Αὐγούστου μηνός.

iii. Auctor Incertus [n]: *Τὴν δὲ τοῦ ἔτους ἀρχὴν οἱ μὲν Ἕλληνες ἀπὸ τοῦ Σεπτεμβρίου ποιοῦντες* (corrige *ποιοῦνται*,) *οἱ δὲ Ῥωμαῖοι ἀπὸ τοῦ Ἰανουαρίου· καὶ οὕτω Ῥωμαῖοι καὶ Ἕλληνες τὰς αὐτὰς μὲν τῶν μηνῶν ἀρχὰς ἔχουσιν οὐ τὰς αὐτὰς δὲ ἀρχὰς τοῦ ἔτους. πάλιν δὲ Ἕλληνες καὶ Ἀλεξανδρεῖς καὶ Αἰγύπτιοι τὰς αὐτὰς μὲν ἀρχὰς τοῦ ἔτους ἔχουσι, τουτέστιν ἐν τῷ αὐτῷ μηνὶ τῷ Θὼθ ἄρχονται τοῦ ἔτους, οὐ κατὰ* (*δὲ*) *τὰς αὐτὰς ἡμέρας· ἀλλ' οἱ μὲν Ἕλληνες ἀρχὴν ἔτους καὶ Ἰνδίκτου ἔχουσιν τὴν πρώτην τοῦ παρὰ Ῥωμαίοις Σεπτεμβρίου μηνός· οἱ δὲ Ἀλεξανδρεῖς πρὸ τριῶν ἡμερῶν τῆς πρώτης τοῦ Σεπτεμβρίου μηνὸς, τουτέστιν κθ' τοῦ Αὐγούστου μηνός. διαφέρουσι δὲ καὶ κατὰ τοὺς μῆνας, ὅτι ἀνὰ τριάκοντα ἡμέρας οἱ Ἀλεξανδρεῖς ἑκάστῳ μηνὶ δίδωσιν* (*διδοῦσιν* or *διδόασιν*,) *ὡς εἶναι τξ' ἡμερῶν τοὺς ιβ' τοὺς παρ' αὐτοῖς μῆνας, αἵτινές εἰσιν τξ' ἡμέραι. συμπληροῦνται δὲ τῇ κγ' τοῦ αὐτοῦ Αὐγούστου κατ' ἔτος, καὶ ποιοῦσιν ἄλλον μῆνα πεντήμερον, ἀπὸ τῶν λοιπῶν πέντε ἡμερῶν, ἤτοι κδ' καὶ κε' καὶ κϛ' καὶ κζ' καὶ κη'. ἐὰν δὲ καταντήσῃ τετραετηρικὸς, τουτέστι βίσεξτος, ἐξ γίνονται αἱ τοιαῦται Ἐπακταὶ λεγόμεναι παρ' αὐτοῖς, καὶ κατὰ δ' ἔτη ἑξήμερος κ', κ. λ.*

iv. Heraclius Imperator [o]: *Ἐπειδὴ ἀναγκαῖόν ἐστι γνῶναι . . . τίνος ἕνεκεν, ζητούντων ἡμῶν εὑρεῖν ποστέαν ἔχει ὁ παρὰ Ἀλεξανδρεῦσι μὴν, τρεῖς ἡμέρας λαμβάνομεν πρὸ τῆς ἀρχῆς τοῦ Σεπτεβρίου· ἰστέον ἡμῶν τῶν Ῥωμαίων τὴν ἀρχὴν τῶν μηνῶν ἀπὸ τοῦ Ἰανουαρίου μηνὸς ψηφιζόντων, τῶν δὲ Ἀλεξανδρέων ἀπὸ τοῦ Σεπτεβρίου τοῦ λεγομένου Θὼθ παρ' αὐτῶν· συνάγονται τέως τοῦ Αὐγούστου πληρουμένου τρεῖς ἡμέραι περισσαὶ πρὸ τῆς ἀρχῆς τοῦ Σεπτεβρίου, ἑκάστου μηνὸς ἀπὸ λ' ἡμερῶν ψηφιζομένου, καθάπερ οἱ Ἀλεξανδρεῖς τοὺς μῆνας ψηφίζειν εἰώθασι . . . . ὅταν οὖν ἔχωμεν ἡμεῖς κθ' τοῦ Αὐγούστου, οἱ Ἀλεξανδρεῖς πρῶτον ἔχουσι τοῦ Θὼθ τουτέστι τοῦ Σεπτεβρίου· ὅταν δὲ ἡμεῖς πρῶτον ἔχωμεν τοῦ Σεπτεβρίου, οἱ Ἀλεξανδρεῖς τετάρτην ἔχουσι τοῦ αὐτοῦ μηνός . . . οἱ δὲ Ἀλεξανδρεῖς ἐκ τῶν η'* (*μηνῶν* Jan. to Aug.) *ἀφαιροῦντες τὰς ε' ἡμέρας καὶ ἐπιτελοῦντες ἕνα μῆνα τὸν λεγόμενον παρ' αὐτοῖς πενθήμερον καταλιμπάνουσι τρεῖς ἡμέρας . . . . ὅτε δὲ δίσεξτόν ἐστιν ἐν τῷ πρὸ τοῦ δισέξτου ἐνιαυτῷ † ὅτε πληρωθῶσι, οἱ Ἀλεξανδρεῖς ἐκείνῳ*

n Selecta ad illustrationem Chronici Paschalis, v. p. 114. It appears from the Nova Collectio Vaticana of Maius, vol. i. pars ii. p. 222. Appendix i. that the true author of this fragment was Severus, most probably of Antioch, a contemporary of Justinian's.

o Ibid. xxi. 212.

τῷ ἐνιαυτῷ καὶ μόνῳ, μετὰ τὸν Αὐγοῦστον τὸν λεγόμενον παρ' αὐτοῖς Μεσωρὶ, ἀντὶ τοῦ πενθημέρου μηνὸς ἑξήμερον ἀποτελοῦσιν.

v. Isidore[p]: Intercalares dies sunt qui juxta Ægyptios supersunt duodecim mensibus, et incipiunt a nono kalendas Septembris (Aug. 24.) et quinto kalendarum memoratarum (Aug. 28.) finiuntur—Apud Ægyptios autem principia mensium ante kalendas quatuor vel quinque dies pronuntiantur, juxta quod formula subjecta declarat . . . . dehinc reverteris ad quarto kalendas Septembris: talique ratione complentur dies ccclx, xii mensium Ægyptiorum. quinque dies supersunt, quos epagomenas vel intercalares sive addititios vocaverunt[q].

SECTION III.—*On the date of the adoption of the Alexandrine calendar.*

On this question, the most important testimony to which we can appeal is that of Theon, author of the *Πρόχειροι Κανόνες*. We shall produce it, as we find it given in Halma's edition of Ptolemy[r]; though it was first published by Dodwell in his Dissertationes Cyprianicæ[s].

Ἐπεὶ οὖν τὴν σύστασιν τῶν προκειμένων προχείρων κανόνων, περιέχουσαν τὰς κινήσεις τῶν ἀστέρων, ἀπὸ χρόνου τινὸς ἐχρῆν προϋφεστάναι, καὶ τοῦ κατ' αὐτὸν τόπου τῶν ἀστέρων· ἐπεὶ καὶ κινήσεώς ἐστιν ἀρχὴ τόπος καὶ χρόνος· πεποίηται (sc. *ὁ Πτολεμαῖος*) *ταύτην ἀπὸ τοῦ πρώτου ἔτους Φιλίππου τοῦ μετ' Ἀλέξανδρον τὸν κτιστὴν κατ' Αἰγυπτίους, καθ' οὓς ὁ ἐνιαύσιος χρόνος ἡμερῶν τυγχάνει τξέ μόνον, Θὼθ νουμηνίᾳ τῆς μεσημβρίας, ὅπερ ἐστὶ πληρωθείσης ἕκτης ὥρας καὶ ἀρχομένης ἑβδόμης, ὡς πρὸς τὴν ἡμετέραν κατ' Αἴγυπτον Ἀλεξάνδρειαν, διὰ τὸ καὶ παρὰ τὰς χώρας γίνεσθαι κατ' ἄλλον καὶ ἄλλον χρόνον*[u] *τὴν μεσημβρίαν—Τὴν δὲ ἀπὸ μεσημβρίας ὥραν λῃψόμεθα, ἑβδόμην ἡμερινὴν ὥραν πρώτην καλοῦντες καὶ τὴν ὀγδόην δευτέραν, καὶ ἑξῆς ὁμοίως, μέχρι τῆς εἰκοστῆς τετάρτης, ἥτις ἐστὶ τῆς ἑξῆς ἡμέρας ὥρα ἕκτη . . . .*

Ἑξῆς[w] *λαμβάνεται ὅ τε μὴν καὶ ἡ ἡμέρα κατ' Αἰγυπτίους τόνδε πάλιν τὸν τρόπον. ἐπεὶ γὰρ ὁ καθ' Ἕλληνας ἤτοι ὁ κατ' Ἀλεξαν-*

p De Natura Rerum, cap. i. 247. A: cf. cap. iv. 247. H. 248. A: cap. vi. 248. G.

q Cf. Bede, i. 507. Computi Ratio, xiii. Ibid. ii. 51. Temporum Ratio, i: 73. ix: 144. xxxv. Ibid. ii. 209. Tempora, x.

r Opp. vi. 27. Πρόχειροι Κανόνες.

s Oxoniæ, 1684. Appendix, p. 106.

u Cf. 29–31 of Halma, 113 of Dodwell.

w Halma, p. 30. Dodwell, p. 110.

δρέας ἀναδιδόμενος ἡμῖν ἐνιαυτὸς ἡμερῶν ἐστι τξε΄· δ΄· ὁ δὲ κατ' Αἰγυπτίους, ὡς ἔφαμεν, τξε΄ μόνον· δῆλον ὅτι κατὰ τέσσαρα ἔτη ἡμέραν μίαν προλαμβάνει ὁ κατ' Ἀλεξανδρέας, κατὰ δὲ ͵αυξ΄ ἔτη ἡμέρας τξε΄, τουτέστι κατ' Αἰγυπτίους ἐνιαυτὸν ἕνα· καὶ πάλιν ἅμα ποιοῦσιν οἵ τε κατὰ τὴν Ἀλεξάνδρειαν καὶ οἱ κατὰ τὴν Αἴγυπτον τὴν ἀρχὴν τοῦ ἐνιαυτοῦ, καὶ ἑξῆς τὰς ἡμέρας καὶ τὸν μῆνα, τοῦ κατ' Αἰγυπτίους χρόνου ὅλον ἐνιαυτὸν προειληφότος. καὶ ἐν τῇ ἀρχῇ πάλιν τοῦ ἑξῆς ἐνιαυτοῦ ἄρχονται οἱ Αἰγύπτιοι τῷ τετάρτῳ τῆς ἡμέρας προλαμβάνειν, καὶ ἑξῆς πάλιν ἀκολούθως.

Γέγονε δὲ ἡ εἰρημένη διὰ ͵αυξ΄ ἐτῶν ἀποκατάστασις ἀπό τινος ἀρχῆς χρόνου ἐν τῷ πέμπτῳ ἔτει τῆς Αὐγούστου βασιλείας, ὡς ἐκ τούτου πάλιν τοῦ χρόνου τὴν ἀρχὴν εἰληφέναι τοὺς Αἰγυπτίους προλαμβάνειν καθ' ἕκαστον ἐνιαυτὸν τῷ τετάρτῳ μέρει τῆς ἡμέρας.

This statement is repeated[e]: *Ἐλέγομεν δὲ τὴν ἀποκατάστασιν τοῦ κατ' Ἀλεξανδρέας χρόνου πρὸς τὸν κατ' Αἰγυπτίους γεγενῆσθαι μετὰ πέντε ἔτη τῆς ἀρχῆς τοῦ Αὐγούστου βασιλείας.* It is repeated also in the extract from MS. 2394[f], and in the calculation there ascribed to the *μέγας Λογοθέτης*, A. D. 1284. Substantially it is repeated by Syncellus also[g], where it is said by him that the epoch of the Alexandrine calendar was fixed in the *sixth* year after the capture of Alexandria, and by order of Augustus: *Ἐπειδὴ...ἀπὸ Ἀλεξανδρείας ἁλώσεως ς΄ τὸ λεγόμενον βίσεξτον προετέθη ὑπὸ Αὐγούστου Καίσαρος, καὶ τῶν τηνικαῦτα σοφῶν*: which leads to a digression; giving an account of the Julian year, the leap-year, and the solar cycle of 28 years[g].

We lay no stress however on these later testimonies; only on that of Theon: according to which this restitution of the equable in terms of the fixed or Julian year, at the epoch of the Alexandrine correction, is dated in the 5th of Augustus. The æra of Augustus is dated by Theon[h] 313 years complete before the æra of Diocletian, A. D. 284[i]: as that is 607 years complete after the epoch of the æra of Philip. Consequently, the first year of that æra bore date Nab. 719 B. C. 30, and the fifth Nab. 723 B. C. 26. In this year of Nabonassar, as our general tables shew, Thoth 1, reckoned from midnight, entered August 30 at midnight; and the next year, Nab. 724 B. C. 25, August 29 at midnight. B. C. 26 too was the first

e Halma, 32. Dodwell, 114.
f Ptolemæi Opp. iii. 7–12.
g i. 590. 13—591. 8.
h Halma, Ptolemæi Opp. vi. 32: *Πρόχειροι κανόνες.*
i Cf. ibid. 69–71.

year of such a cycle of leap-year as that which we have shewn to have been the proper one of the Alexandrine calendar; and B. C. 25 was the second. This therefore must have been the date of the Alexandrine correction, according to Theon; Nab. 723, B. C. 26: and its epoch, August 30 at midnight, that year must have been taken directly from the equable Thoth the same year: which was what we undertook to prove.

The application of such a term, as this of *ἀποκατάστασις*, to the coincidence of dates, (the equable and the fixed,) at this point of time, is an argument that Theon did not suppose these dates to have met for the *first* time in the fifth of the æra of Augustus; but for the *second* time: and the same inference follows from his use of the adverb *πάλιν*, in speaking of the anticipation of the equable on the fixed year, dated from this coincidence also; as not beginning in a certain way for the first time, but as renewed in the same way, and beginning a second time. Now the best explanation of all this is the connection of the Alexandrine calendar of later times with the Sothiacal calendar of earlier date. It has been seen that the proper epoch of the Sothiacal calendar was July 22 B. C. 1350: and that the cycle of leap-year in this calendar bore date from B. C. 1350. It is manifest that the Alexandrine cycle agreed exactly with this. The date of this latter being B. C. 26, and that of the former B. C. 1350—it is evident that the first Alexandrine cycle was the 332d Sothiacal one.

Now it has been already made to appear[k] that if the fragment attributed to Theon, relating to the æra of Menephres, was genuine, Theon himself must have reckoned the epoch of the Sothiacal period to have been B. C. 1346; which was only four years short of its true date: i. e. only one cycle of its proper cycle of leap-year complete. It would make no difference to the Sothiacal cycle of leap-year, nor to the relation of the Alexandrine cycle to that, whether it was reckoned from B. C. 1350 or B. C. 1346. We will assume therefore for argument's sake, and in conformity to the hypothesis of Theon himself, that its proper epoch was B.C. 1346. Let us therefore draw out the scheme of the Sothiacal period

k Vol. iii., 65. Dissertation xiv. ch. ii. sect. x.

from B. C. 1346 to B. C. 26 in periods of 120 years, both in the equable and in the Julian æra.

Scheme of the Sothiacal period in periods of 120 *years, from Thoth* 1, *æra cyc.* 2661 *July* 21 *B. C.* 1346 *to Thoth* 1 *Nab.* 723 *August* 30 *B. C.* 26.

Period.	B. C.	Æra cyc.	Æra of Nab.	Equable date.		Julian.
i	1346	2661	...	Thoth	1	July 21
ii	1226	2781	...	Thoth	30	— 21
iii	1106	2901	...	Phaophi ..	29	— 21
iv	986	3021	...	Athyr	29	— 21
v	866	3141	...	Chœac ...	27	— 21
vi	746	3261	2	Tybi	27	— 21
vii	626	....	122	Mecheir ..	26	— 21
viii	506	....	242	Phamenoth	26	— 21
ix	386	....	362	Pharmuthi	26	— 21
x	266	....	482	Pachon ...	26	— 21
xi	146	....	602	Paüni	26	— 21
xii	26	....	722	Epiphi ...	26	— 21
	B. C. 26		Nab. 723	Thoth	1	August 30

It is evident on this principle how naturally it might be supposed that the equable year B. C. 26 was returning to the same relation to a fixed date, like August 30, in which it had stood to it B. C. 1346; so as strictly to entitle the coincidence of Thoth 1 with August 30 at this time to the name of an ἀποκατάστασις: and *that* without any prejudice to the truth of the fact that the real date of the equable Thoth, B. C. 1346, was July 21 not August 30*.

* The opinions of chronologers, respecting the epoch of the Alexandrine correction, have varied only between Nab. 719 B. C. 30, and Nab. 724 B. C. 25. One objection to the latter of these dates would be, that the cycle of leap-year, peculiar to the Alexandrine calendar, on that principle must have borne date in the first year of the Julian, instead of the fourth; six months later than the proper Julian cycle of leap-year, instead of six months earlier: another, that the proper Julian date of the Alexandrine Thoth, on the same principle, ought to have been August 29, not August 30: not even in the leap-year of its proper cycle itself. The first of the equable Thoth Nab. 724 necessarily fell on August 29: and if the Alexandrine correction was adopted in that year, the Alexandrine Thoth must have done the same: and in this case, it never could have fallen on August 30 at all. Its proper Julian exponent must have been August 29, in every year both of its own cycle and of the Julian too alike.

The objection to the former of these dates, B. C. 30, would be that on

SECTION IV.—*On the historical date of the reduction of Alexandria,* B. C. 30; *and on the epoch of the æra Augusta at Rome.*

This assumed epoch of the Alexandrine correction, B. C. 30, would coincide with the year of the reduction of Alexandria by Cæsar (at that time Octavianus), and of the conquest of Egypt; and this coincidence, it may perhaps be supposed, might have something to do with the Alexandrine correction; in particular with the year in which it took place.

That the submission of Alexandria, and along with it that of the rest of Egypt, probably happened in the month of

that supposition, though the cycle of leap-year would be the same, the Julian epoch of the correction would not. The first of the equable Thoth Nab. 719 necessarily fell on August 31: and that must have been the date of the Alexandrine; if the Alexandrine correction was really adopted in B. C. 30. The Julian dates of this Thoth, on this principle, must have been August 31 and 30; not August 30 and 29.

Mr. Ideler has advanced a conjecture, intended to reconcile the acknowledged Julian epoch of the correction, August 29, (in the common years at least,) with this possible date of its adoption, B. C. 30, by supposing the Julian date of the correction taken from the Roman calendar, B. C. 30, at a juncture of circumstances when, as it is well known, it had been for some time, (in fact ever since the death of Julius Cæsar,) irregularly administered. But the truth of the case, both with respect to the original date of the Roman correction by the Dictator Cæsar and with respect to this irregular administration of the calendar for 36 years afterwards, has never been known to the learned. B. C. 30 there was absolutely no difference between the Roman calendar and the Julian properly so called: the 29th August Roman, (at that time the 29th Sextilis,) and the 29th of August Julian were one and the same. It is impossible indeed to propose an hypothesis of this kind which will agree with the matter of fact that August 30 was always the date of the Alexandrine Thoth, in the first year of its proper cycle, and August 29 in every other; except by assuming that it might or it must have been attached to August 30, without any regard to the equable Thoth for the time being, and whether that was falling on August 30 too, or not. If the first Thoth of this correction was the equable Thoth for the time being; then the correction must have been made when the equable Thoth was falling on August 30. That was the case, Nab. 723, in the 5th year of the æra of Augustus, B. C. 26, the year assigned to it by Theon; but in no year before or after it: and this, in our opinion, is decisive of the question of the true date of the correction itself.

August, B. C. 30, U. C. 724, might be inferred from Suetonius[l]; who tells us the principal reason why the name of Sextilis was changed into that of August was because In hoc (mense) et primus consulatus (Augusti sc.) et insignes victoriæ obtigissent. We know at least from history of no remarkable successes of his obtained in this month, if it was not on this occasion in Egypt, in his contest with Antony. Macrobius however has removed all uncertainty upon this point, by preserving the words of the Senatus Consultum, which changed the name of Sextilis[m]: for in this the submission of Egypt in this month is distinctly specified as one of the grounds of the change: Cum imperator Cæsar Augustus mense Sextili et primum consulatum inierit, et triumphos tres in urbem intulerit; et ex Janiculo legiones deductæ secutæque sint ejus auspicia ac fidem; sed et Ægyptus hoc mense in potestatem populi Romani redacta sit, finisque hoc mense bellis civilibus impositus sit; atque ob has causas hic mensis huic imperio felicissimus sit ac fuerit: placere senatui ut hic mensis Augustus appelletur.

We learn from Orosius[n], that the principal event of the contest between Augustus and Antony in Egypt, and the preliminary to the submission of the rest of that country to him, the surrendry of Alexandria, took place on the first of August. Kalendis Sextilibus, says he, (Augustus being now before Alexandria B. C. 30,) prima luce Antonius cum ad instruendam classem in portum descenderet, subito universæ naves ad Cæsarem transierunt. cumque unico præsidio spoliatus esset, trepidus se cum paucis recepit in regiam. deinde inminente Cæsare turbataque civitate idem Antonius sese ferro transverberavi[o]. The same date appears in one of the Julian calendars of antiquity, the Antiatine, and virtually in another the Amiternine also[p]; each of them contemporary with the reign of Augustus or of his immediate successors: and though Scaliger seems to doubt of the fact[q], it is as-

[l] Vita Augusti, xxxi. § 2.

[m] Saturnalia, i. xii. 261.

[n] vi. 19. § 22. p. 439. Havercampii. The same fact is virtually recognised by Dio Cassius, li. 16: cf. lv. 6. B. C. 8. also Plutarch, Antonius, lxxx.

[o] Cf. Plutarch, Antonius, lxxv–lxxviii. Suetonius, Augustus, xvii. 7–11. Dio, li. 9–10.

[p] Apud Foggini.

[q] De Emendatione, v. 495 B. Scaliger however confounds the victory over Antony and Cleopatra, supposed to have been ever after celebrated at Alexandria on August 1, with the battle of Actium, on the second of September, Roman, B. C. 31, U. C. 723.

serted by Durandus[r] that the feast of St. Peter ad vincula, on the kalends or first of August, was expressly instituted and attached to that day by the empress Eudoxia, wife of Theodosius the younger, in order that it might take the place of a pagan festival which the people of Alexandria were still in the habit of celebrating on August 1, in commemoration of this event; the submission of their city to Augustus on that day.

It is certain too that Augustus must still have been in Egypt some time after August 1. It appears from Suetonius[s] that he travelled in Egypt, and inspected its curiosities; and if so on this occasion. We have seen already[t] that he declined at this time to visit the Apis. It is stated too[u] that he caused the διώρυχες, fossæ, or canals, which conveyed the water from the Nile, to be cleared and opened afresh *militum opera:* and if that was not done after his departure, which is most probable, it would imply that he must have been there later than the total subsidence of the waters of the Nile; that is, after October at least, B. C. 30. Yet notwithstanding all this, there is no proof extant in history, nor any reason to believe, that the least change was made in the civil calendar of the Egyptians, while he was still among them, either by his orders, or by the Egyptians of their own accord*.

We are informed indeed by Dio[w], that the news of the

* Plutarch, Antonius, lxxiv: Augustus marched to Alexandria on this occasion διὰ Συρίας, οἱ δὲ στρατηγοὶ διὰ Λιβύης. It appears from Propertius that he too accompanied him, and that he was at Alexandria not only when Antony died, but when Cleopatra also died:

> Castraque Pelusî Romano subruta ferro,
> Antonîque graves in sua fata manus.
> iii. ix. 55. cf. iii. xi. 29–54.

When Augustus entered Alexandria at last, he was purposely attended by the philosopher Areius, a native of Alexandria, in order to encourage his fellow citizens.—Plutarch, Regum et Imperatorum Apophthegmata, Aug. iii. Reipublicæ gerendæ Præcepta, xviii: Antonius, lxxx: cf. Dio li. 16.

The particulars from the death of Antony to that of Cleopatra must have occupied a considerable interval of time: Plutarch, Antonius, lxxviii–

r Rationale, vii. 19.
s Vita, xciii. § 3.
t Vol. iii. 585. Diss. xiii. ch. vi. sect. v.
u Suetonius, Vita, xviii. § 2. Dio, li. 18.
w li. 19. Cf. Appian. B. C. iv. 51.

death of Antony and of the submission of Alexandria arrived at Rome while Cicero the younger was still serving the office of Consul Suffectus; that is, between the Ides of September, B. C. 30, according to the Fasti, and the Kalends of November: and that the decrees which were passed in consequence of it were passed under his auspices. Among these, the following: *Τήν τε ἡμέραν ἐν ᾗ ἡ Ἀλεξάνδρεια ἑάλω ἀγαθήν τε εἶναι, καὶ ἐς τὰ ἔπειτα ἔτη ἀρχὴν τῆς ἀπαριθμήσεως αὐτῶν νομίζεσθαι.*

Chronologers have generally construed this passage of Dio's, as if the *αὐτῶν* were to be referred to Alexandria, and the decree was to be understood to have a special and exclusive reference to the people of Alexandria; whereas its obvious and natural reference is to the *ἔτη* just before: and the meaning of the decree is simply that the day of the reduction of Alexandria should be the epoch of an æra, or annual reckoning, from that time forward, in commemoration of the event. It might be intended then to found an æra, and an æra like the æra Augusta; but it was clearly in any case an æra no more designed for Egypt or for Alexandria than for any part of the empire besides.

The æra Augustana did not actually come into vogue at Rome, until two years after this time, U. C. 727 B. C. 27; but in Egypt itself it came into force U. C. 725 ex kal. Jan. B. C. 29: which was as early as it could. We learn the fact of this distinction from Censorinus[x]: and the true reason why the decree, if really passed with the intention of founding the æra Augusta at Rome itself, B. C. 30, yet actually took effect there only in B. C. 27, appears to have been that

lxxxvi. Her death itself appears to have taken place only three days before the time fixed on for the departure of Augustus, lxxxiv. The asp which she made use of was conveyed in a basket of figs, just brought from the country, and consequently of that year's growth: and that may be an argument of the end of August or of the beginning of September. Cf. Dio, li. 11–15. Zonaras, x. 31. 529 C. 530 D.

Penteteric games were instituted at Nicopolis near Alexandria (founded itself to commemorate the victory over Antony), Dio li. 18. Strabo xvii. i. Cf. Jos. De Bello iv. xi. v. But at what time of the year they were celebrated does not appear. Most probably in August too.

x De Die Natali, xxi.

this year was also the date of the partition of the provinces between Augustus, and the senate and people; and the date of the assumption of the name of Augustus by him himself[y]: his name until then having been simply Cæsar Octavianus. The year in which Censorinus was writing his own work, Coss. Ulpio et Pontiano, U. C. 991 A. D. 238, ex kalendis Jan. is reckoned by him the 265th year of this æra, at Rome: and that is correct. But of the same year and according to the same reckoning in Egypt he observes: Sed Ægyptii, quod biennio ante in potestatem populi Romani venerunt, habent hunc Augustorum annum cclxvii: and this gives the epoch of the æra Augusta in Egypt, ex kalendis Januariis, U. C. 725, B. C. 29.

If therefore the Roman senate imposed on the people of Alexandria no necessity of adopting a Julian calendar in B. C. 30; there is no reason why they might not be left to choose their own time for doing so. It is very probable that the introduction of an æra Augusta, B. C. 30–29, might lead in its consequences to the institution of a Julian calendar also; at Alexandria, at least. But if this had not been instituted so early as B. C. 30, it is morally certain that it would not be so before B. C. 26: because the cycle of leap-year of this calendar must agree with the Sothiacal; and therefore if it had not been already attached to B. C. 30, it could not be attached to an earlier date than B. C. 26. We are entirely of opinion ourselves that this year, B. C. 26, was actually fixed upon, because it stood at the distance of an integral number of periods of 120 years from B. C. 1346; and because B. C. 1346 at this time was known or supposed to be the true epoch of the Sothiacal period itself: a conclusion ultimately resolvable into the fact that the proper epoch of the period, in the first year of the cycle of leap-year, at this time was July 21, which at first had been July 22. Eleven periods of 120 years, reckoned back from Thoth 1, Aug. 30, B. C. 26, would bring them to Thoth 1, July 21 B. C. 1346 exactly. To go back to July 22 would have required four years more.

y Cf. Dio liii. 3, B. C. 27: 16. 18. 20: 12–15: Ovid Fasti, i. 587–590. Prænestine calendar or Fasti Verrii Flacci apud Foggini.

It remains then merely to subjoin the type of the Alexandrine calendar, for every year of its proper cycle of leap-year *.

Alexandrine Calendar.

First year of the cycle of leap-year.				*Second, third, and fourth years.*	
Months.		Days.	Names.	Julian dates.	Julian dates.
i	—	30	Thoth	August . . .30	August . . 29
ii	—	30	Phaophi	September 29	September 28
iii	—	30	Athyr	October. . . 29	October. . 28
iv	—	30	Chœac	November 28	November 27
v	—	30	Tybi	December 28	December 27
vi	—	30	Mecheir	January . . 27	January . . 26
vii	—	30	Phamenoth	February 26	February 25
viii	—	30	Pharmuthi	March . . .27	March . . .27
ix	—	30	Pachon	April 26	April. 26
x	—	30	Paüni	May. 26	May. 26
xi	—	30	Epiphi	June. . . . 25	June. . . . 25
xii	—	30	Mesore	July. . . . 25	July. 25
xiii	—	5	Epagomenæ	August. . . 24	
Fourth year		6	—	— 24	

* Many dates have been brought to light in Mons. Le Tronne's Recueil of inscriptions discovered in Egypt, calculated to illustrate the Alexandrine calendar: for the particulars of which however we refer our readers to Mons. Le Tronne's own work. The earliest appears to be the date of an inscription, found on the Propylaon of Tentyra, of which the following is a copy: tome i. ix. p. 81.

> Ὑπὲρ αὐτοκράτορος Καίσαρος θεοῦ υἱοῦ
> Διὸς Ἐλε(υθερίου) Σεβαστοῦ ἐπὶ Ποπλίου
> Ὀκταυΐου ἡγεμόνος καὶ|Μάρκου Κλωδίου
> Ποστόμου ἐπιστρατήγου Τρύφωνος
> Στρατηγοῦντος οἱ ἀπὸ τῆς μη|τροπόλεως| (καὶ
> το)ῦ νομοῦ τὸ πρόπυλον Ἴσιδι θεᾷ μεγίστῃ
> καὶ τοῖς συννάοις θεοῖς. Ἔτους λα' Καίσαρος, Θωῢθ Σεβαστῇ.

This inscription being referred to the first of Augustus in Egypt, Thoth 1 B. C. 30; its date would be some time after Thoth 1 A. D. 1. With regard to the designation of Θωῢθ Σεβαστῇ, Mons. Le Tronne understands it with the ellipsis of ἡμέρᾳ; and conjectures, with great probability, that it was meant of some particular day in the Alexandrine month Thoth, which coincided with Augustus' birth-day, ix kal. Octobres, September 23 Roman, when that appellation was given it. There is reason to believe that particular days in the Egyptian calendar did receive particular names. On the Rosetta stone (xxv. i. P. ii. 250. l. 46.) we read of Mesore 30, the

SECTION V.—*On the supposed date of the Alexandrine calendar, August* 11.

Before we take our leave of this subject, it is necessary to consider the grounds of an opinion, proposed by a learned

birth-day of Ptolemy Epiphanes, and of Mecheir 17, the day of his accession, as *ἡμέραι ἐπώνυμοι*. Also, on the *στήλη* or pillar in the island of Dionysos, (xxxii. i. P. ii. 390, l. 10.) the *ἡμέραι ἐπώνυμοι* are mentioned by name, as a particular class of days. The *ἡμέραι ἐπώνυμοι* are alluded to in the letter of Jonathan Maccabæus to the Lacedemonians, in Josephus, Ant. Jud. xiii. v. 8 (cf. 1 of Macc. xii. 6–18.): the days meant being probably those which had a distinct name and distinct services in the Jewish calendar; such as the Sabbath, the new moons, Pentecost, the day of atonement, and the like. In like manner the *χρήματα ἐπώνυμα* are mentioned in Josephus, (Ant. Jud. xvi. ii. 4. (p. 643, 644.) in the sense of the dues to the temple from the Jews of the dispersion; i. e. monies, dedicated to God, and called his, or after his name.

In this particular instance however of *Θωῢθ Σεβαστῇ*, it must still be doubtful what day of Thoth is meant; because Sept. 23 Roman, and Sept. 23 Julian, throughout the reign of Augustus were not necessarily the same thing: as will appear, if we ever come to treat of the Roman calendar.

But the most remarkable date of this kind is one which Mr. Le Tronne has produced from another inscription, p. 83. (Cf. Corp. Inscriptionum, iii. P. xxix. p. 445. No. 4957):

L. B. *Λευκίου Λιβίου Σεβαστοῦ Σουλ-*
Πικίου Γάλβα αὐτοκράτορος Φαωφὶ
α' Ἰουλίᾳ Σεβαστῇ.

The year to which this belongs, by the Egyptian rule, is determined to Phaophi 1, A. D. 68, in the second year of the reign of Galba, supposed to be reckoned from Thoth 1, Aug. 30, A. D. 67. Now this day is further specified as *Julia Augusta:* from which it is an obvious inference that it must have received that name in honour of Livia, the wife of Augustus, some time after she herself received the title of Julia Augusta.

She was constituted Augusta and Julia according to Tacitus, (Ann. i. 8; cf. 14,) by the will of Augustus himself, (cf. Suetonius, cii. 3.): and it may be collected from Dio, lvi. 46, and from the Amiternine calendar, that she actually received the name of Julia, when divine honours were decreed to Augustus, that is, Sept. 17 Roman (xv kal. Oct.) A. D. 14. She died, according to Tacitus, (Ann. v. 1,) U. C. 782, A. D. 29: according to Dio, (lviii. 2. 1: cf. lvii. 24,) A. D. 26: cf. Suetonius, Tib. li. 4, 5: at 82 years of age, as we are told by Pliny, H. N. xiv. 8. p. 53; cf. xix. 29. p. 380; at 86, according to Dio, lviii. 2.

Pliny tells us also, (xiii. 23. 723, 724,) that the Egyptians gave the name of Augusta to the best sort of paper made among them, or the first of all, and that of Livia to the next best; cf. xiii. 24. 731. 734: in the life time

member of the French Academy of Inscriptions, Mons. de la Nauze [z], that the proper Julian epoch of the fixed Egyptian calendar was August 11. This opinion is espoused by Mr. Eckhel, in his Doctrina Numorum Veterum; and he calls this epoch the style of the Alexandrine Egyptians, and that of August 29 or 31 the style of the rest of the Egyptians. For such an epoch as August 31 in any style in Egypt there

of Livia too; which shews a predisposition on their part to pay her such a compliment as this of calling one of the days of one of their months Julia Augusta, in honour of her. It seems this was the first of the Alexandrine Phaophi. Now there are only two Julian terms with which the first of Phaophi could coincide in the Alexandrine calendar, Sept. 29 and Sept. 28 —Sept. 29 in the first year of its proper cycle of leap-year, Sept. 28 in the common years. If the Egyptians called a certain day in Thoth the Augusta of Thoth, because it coincided with the birthday of Augustus, we may presume that they called Phaophi 1 the Julia Augusta of that month, because it coincided with the birthday of Livia.

But what was the birthday of Livia? on this principle, either Sept. 29 or Sept. 28; because Phaophi 1 could coincide with no Julian date but one of those. We may probably collect from Suetonius, (Tib. xxvi. 5; cf. Dio, lvii. 18,) that Livia was born in October (cf. Tacitus, vi. 5.) If that was the case, there would be only one way of reconciling these facts together; and that is by supposing that Livia's birth day was the kalends of October, and that Phaophi 1, in the Alexandrine calendar, received the name of Julia Sebaste when it was coinciding with Sept. 29; that is, in the first year of its proper cycle of leap-year: and when Sept. 29 was the true Julian date of the kalends of October, or October 1 Roman. It will appear from our Julian calendar that this was actually the case, A. D. 15: that is, the year after the death of Augustus: which we should consequently believe to have been the true date of the imposition of this name on the first of Phaophi in Egypt.

This date of the Julia Sebaste, as the same with the Alexandrine Phaophi 1, yet as meant of the birthday of Livia, the kalends of October, is consequently extremely valuable for the illustration of the Roman calendar. The Roman kalends were left by Cæsar attached to a Julian date two days earlier than themselves; Jan. 1 Roman to Dec. 30 Julian, Oct. 1 to Sept. 29, and so on. They swerved from that relation for a certain number of years after his death. They were again restored to it by Augustus; and they again declined from it soon after the death of Augustus. But they were strictly in conformity to it at the time of his death, A. D. 14, and for five years afterwards too. We suppose this peculiar name to have been bestowed on Phaophi 1 in A. D. 15; and at that time October 1 Roman was actually the same as Sept. 29 Julian.

[z] Mémoires de l'Academie, tome xvi. p. 174 sqq. De l'année solaire des Egyptiens, dite l'année Alexandrine.

is no authority extant: in other respects, the distinction thus drawn is contrary to the idiom of antiquity; according to which καθ' Ἕλληνας and κατὰ Ἀλεξανδρεῖς mean the same thing, in opposition to κατὰ Αἰγυπτίους: and the latter being always intended of the equable year and of its use, the former is always to be understood of the Alexandrine or the fixed.

It cannot be denied that there is testimony extant, which *prima facie* seems to confirm this opinion: viz. a certain passage in the Natural History of Pliny the Elder. The truth however is that this testimony is ambiguous. It does not necessarily lead to the inference founded upon it: and such as it is, there is every reason to suppose that Pliny himself derived it from some other quarter; and it may very well be questioned whether he exactly understood it himself. We shall proceed to consider it however, in order that our readers may judge of it for themselves.

SECTION VI.—*On the stated time and direction of the intercourse by sea between Egypt and India.*

It is necessary however to begin with referring to his account of the navigation of the Sinus Arabicus, and of the Red sea; and of the stated seasons of the intercourse carried on by sea for commercial purposes between Alexandria and India; and of the course or direction which it usually followed: since it is in the midst of this account that we find the testimony in question.

He premises to this account a recapitulation of the voyage of the fleet of Alexander, which was the first to navigate these seas, and to make them known to the Greeks. This voyage was performed in B. C. 326 and B. C. 325; and it is related in the Indica of Arrian [a]. If we compare Pliny's account of it with his [b], we shall perceive that, along with a general resemblance between them, there is still so much of circumstantial difference, as to lead to the conclusion that though the same in substance they must have been compiled from different sources: and this appears to have been

[a] Opp. 312. cap. i—360. cap. xliii. Gronovii, 1704.

[b] Pliny, H. N. vi. 26–28: 30: ix. 2: xiii. 51. Arrian, Indica, i.–xliii: particularly xviii. p. 332–xlii. 357. Cf. also Strabo, xv. 1. 2.

the case: for Arrian professes to have followed Nearchus; Pliny gives us reason to believe that he took his account principally from Onesicritus. Nearchus left an account of Alexander's Indian expedition in general[c], as well as of this voyage in particular; but so did Onesicritus also—and this is often referred to by the ancients[d]: and that Pliny followed him chiefly if not exclusively in this part of his work, may be inferred from his own words; Sed priusquam hæc generatim persequamur, indicare convenit quæ prodit Onesicritus classe Alexandri circumvectus in mediterranea Persidis ex India; narrata proxime a Juba; dein eam navigationem quæ his annis comperta servatur hodie[e]: and in particular from the fact that he appears to have considered Onesicritus the captain or admiral of Alexander's fleet, on this occasion[f]; for that was the account which he himself gave in his own narrative of the voyage, of his own relation to it: though in reality, as the rest of the historians of Alexander inform us, he was only the master-pilot (ἀρχικυβερνήτης)[g]; the pilot of the admiral's ship, and so of the whole fleet *.

* Onesicritus is said to have been a native of Astypalæa in Crete[a]; and before he attached himself to Alexander the Great a disciple of Diogenes, the Cynic philosopher[b]. It is agreed that he had the command of the pilots (he was the master of the fleet) in this voyage of Nearchus; and that he was previously the pilot of Alexander's own ship in which he sailed down the Indus[c]. Yet he is mentioned only once by Arrian in the account of the voyage itself[d]. The ancients speak of him as the least trustworthy of all the historians of Alexander; i. e. as more given to the marvellous than any even of them. Aulus Gellius classes him with notorious writers of fable, Aristeas of Proconnesus, Isigonius of Nicæa, Ctesias, Polystephanus, and Hegesias[e]: and Strabo observes of him: Ὃν οὐκ Ἀλεξάνδρου μᾶλλον ἢ τῶν παραδόξων ἀρχικυβερνήτην προσείποι τις ἄν.

c Cf. Pliny, H. N vi. 30. 692. Strabo, xi. 13: xv.

d Arrian, vi. 2. Strabo, xi. 11: xv. 1: and passim. Plutarch, Alexander, viii: xlvi: lx: lxi: lxv. Pliny, H. N. ii. 75: vii. 2. p. 30: xii. 18: xv. 19. 204. Seneca, Opp. iv; De Beneficiis, vii. ii. 6. Lucian, ii. 53, 54. Quomodo historia conscribenda sit, 40: iii. 348; De Morte Peregrini, 25. Ælian. Nat. Anim. xvi. 39: xvii. 6.

e H. N. vi. 26. Cf. ii. 75.

f Ib. vi. 24. p. 638. Cf. Solinus, liii. 2.

g So Arrian, vi. 2: of Onesicritus, and this very account: Ὃς ἐν τῇ ξυγγραφῇ, ἥντινα ὑπὲρ Ἀλεξάνδρου ξυνέγραψε, καὶ τοῦτο ἐψεύσατο, ναύαρχον ἑαυτὸν εἶναι γράψας κυβερνήτην ὄντα. Cf. Suidas, in Νέαρχος. Strabo, xv. 2. Plutarch, Eumenes, ii; Alexander, lxvi. lxviii. lxxiii.

a Arrian, Indica, xviii. Ælian, De Nat. Anim. xvi. 39. Cf. Arrian, De Expeditione, vi. ii. xxi. Plutarch, Alex. lxv.

b Plutarch, De Alexandri Fortuna, x.

c Arrian, Indica, xviii. Plutarch, Alex. lxvi. Strabo, xv. 2.

d Cap. xxxii. p. 348.

e Noctes Atticæ, ix. 4.

To proceed then to Pliny's account of this voyage in his own time. Having premised the particulars of the voyage of

πάντες μὲν γὰρ οἱ περὶ Ἀλέξανδρον τὸ θαυμαστὸν ἀντὶ τἀληθοῦς ἀπεδέχοντο μᾶλλον, ὑπερβάλλεσθαι δὲ δοκεῖ τοὺς τοσούτους ἐκεῖνος τῇ τερατολογίᾳ· λέγειν δ' οὖν τινα καὶ πιθανὰ καὶ μνήμης ἄξια, ὥστε καὶ ἀπιστοῦντα μὴ παρελθεῖν αὐτά [f].

Nearchus on the other hand was a Macedonian, a native of a city of Macedonia called *Λήτη*. *Λήτη· πόλις Μακεδονίας* [g]*· ἀπὸ τοῦ πλησίον ἱδρυμένου Λητοῦς ἱεροῦ, ὡς Θεαγένης Μακεδονικοῖς· τὸ ἐθνικὸν Λητaῖος· οὕτω γὰρ ἱστορεῖται Νέαρχος Λητaῖος τῶν Ἀλεξάνδρῳ τῷ μεγάλῳ συστρατευσαμένων ὁ διασημότατος.* Yet Arrian twice calls Nearchus the commander of this Indian fleet Nearchus the Creatan [h]; and Nearchus the Cretan is mentioned among the followers of Antigonus, after the death of Alexander, and during the contests of the Diadochi [i]: so that there was such a person in the lifetime of Alexander, and one who probably accompanied him into the East. Yet we are entirely of opinion that in calling the Nearchus, entrusted with the command of this fleet and with the duty of this first voyage from the mouth of the Indus, a Cretan, Arrian was mistaken.

Strabo has referred both to Androsthenes of Thasus and to Orthagoras for an account of the voyage of Nearchus [k]; the former of whom accompanied him himself. Pliny however appears to have principally followed Onesicritus: and that circumstance possibly serves to explain an observation of his, which might have applied to the account of Onesicritus, though it would not be true of that of Nearchus: Onesicriti et Nearchi navigatio [l] nec nomina habet mansionum nec spatia: primumque Xylenepolis ab Alexandro condita unde ceperunt exordium juxta quod flumen aut ubi fuerit non satis explanatur. Arrian has followed Nearchus [m]; and in *his* account both places and distances are very regularly mentioned. If Pliny comprehends Nearchus in this statement along with Onesicritus, it is probably because he supposed him to have been associated with Onesicritus in the command of the expedition; a supposition which appears in Quintus Curtius also [n].

There is nevertheless a substantial agreement between Pliny's account of the voyage, from whatsoever quarter it was derived, and this of Arrian, sufficient to shew that both are the same in general; and yet there is not so much of agreement in particulars as there must have been, if Pliny had copied from precisely the same accounts as Arrian. Xylenepolis does not appear in Arrian [o]. We know from him only that the fleet set out from the mouth of the Indus, the Indian Delta, Pattala, or Pattalene [p]. The city

[f] xvi. 1.
[g] Stephanus Byz. Cf. Plut. Alex. x.
[h] Indica, xviii.
[i] Plutarch, Eumenes, xviii. Diodorus, xix. 69. 19.
[k] xvi. 3.
[l] H. N. vi. 26. p. 660.
[m] De Expeditione, vi. xxviii. Indica, xix. xx.
[n] ix. x. 3: x. i. 10.
[o] De Expeditione, vi. xx–xxi. Indica, xviii–xxi.
[p] De Expeditione, vi. xx–xxi. Cf. Strabo xv. 2.

the fleet of Alexander, he continues[h]: Postea a Syagro Arabiæ promontorio Patalen *Favonio,* quem *Hippalum* ibi vocant, peti certissimum videbatur, xiii. xxii mille passuum æstimatione (1322 miles.) secuta ætas propiorem cursum tutioremque indicavit, si ab eodem promontorio Zigerum portum Indiæ peteret. diuque ita navigatum est, donec compendia invenit mercator, lucroque India admota est. quippe omnibus annis navigatur ... nec pigebit totum cursum ab Ægypto exponere, nunc primum certa notitia patescente. digna res, nullo anno minus H. S. quingenties imperii nostri exhauriente India, et merces remittente quæ apud nos centuplicato veneant.

The course is then described. First, from Alexandria to Juliopolis two miles: from Juliopolis to Coptus[i] on the Nile, by favour of the Etesian winds, (which implies that the voyage was going on about the middle of July or later,) 303 miles, in twelve days: from Coptus, across the desert, on camels to

or town of Arbis is mentioned in Pliny[q] but not in Arrian; though the river Arabis is, which probably gave it its name[r]. The foundation of the Alexandria noticed by him[s] is implied in the Indica[t], and recognised in the Expeditio[v]. The river Τόμηρος in the Indica[u] is the flumen Tuberum in Pliny[w]. He adds Circa quod Pasiræ[w]; and both Πάσιρα and the Πασιρέες round about it are mentioned in the Indica also[x]. In this part of the voyage the fleet was sailing along the coast of the Ichthyophagi; and according to Pliny it took up twenty days[y]. Twenty days may easily be made out of the same part of the Indica[z]; and the whole length of this coast is computed at last at 10,000 stades: which at the rate of 500 stades a day would require 20 days. The island of the Sun in Arrian[a] is Solis insula in Pliny too[b]: the island of the Nereids in the former is Nympharum Cubile in the latter. Arrian's three islands off the coast of Carmania[c] appear in Pliny[d]; and what Arrian calls 'Οάρακτα he calls Oracla. Macetas in Arrian[e] is Macas in Pliny[f]: Gogana in the former[g] is Gauratæ in the latter[h]: the river Sitacus is Sitiogagus: Heratemis and Granis are mentioned by both[i].

q H. N. vi. 26. Cf. vii. 2. 32: ix. 2. 609: Ptolemæi Geographia, vi. 21. 5.

r De Expeditione, vi. xxi: Indica, xxi. Cf. Strabo, xv. 1.

s H. N. vi. 26.

t xxiii.

v vi. xxi. xxii. Cf. Q. Curtius ix. x. 7. Ptolemæi Geographia, vi. 20. 4.

u xxiv.

w H. N. vi. 26.

x xxvi. p. 341.

y H. N. vi. 26.

z xxvi–xxix.

a xxxi.

b H. N. vi. 26. 661.

c xxxvii.

d H. N. vi. 26. 663.

e xxxii.

f H. N. vi. 26. 663.

g xxxviii.

h H. N. vi. 26. 663.

i Indica xxxix. H. N. 26. 664.

h vi. 26. 666.

i Cf. v. 11. p. 343.

Berenice, on the Red sea, 258 miles in twelve days more[k]: Sed quia major pars itineris, he observes, conficitur noctibus propter æstus, et stativis dies absumuntur, totum a Copto Berenicen iter duodecimo conficitur die[l].

He proceeds: Navigare incipiunt (i. e. after taking ship at Berenice) æstate media, ante Canis ortum aut ab exortu protinus[m]: veniuntque circiter xxx die Ocelim Arabiæ aut Canen thuriferæ regionis. est et tertius portus qui vocatur Muza, quem Indica navigatio non petit, nec nisi thuris odorumque Arabicorum mercatores. intus oppidum: regia ejus adpellatur Saphar, aliudque Saue: Indos autem petentibus utilissimum est ab Oceli egredi.

Muza and Ocelis were localities of Arabia Felix, at the very extremity of the Sinus Arabicus, just where it enters the Red sea. So long (i. e. 30 days) did it take to accomplish thus much of the voyage from Berenice. There was another Berenice on the opposite point of the coast to Ocelis; Berenice ἐπὶ δείρης: which Pliny does not mention here.

He continues: Inde (i. e. from Ocelis) vento Hippalo navigant, (the same kind of wind which he called Favonius, supra; but in reality, as the direction and bearing of the different places next mentioned, relatively to Ocelis, imply, a *south-west* wind,) ad primum emporium Indiæ Muzirim, (according to D'Anville[n], Vizindruk, at present, in the Decan of India,) non expetendum, propter vicinos piratas qui obtinent locum nomine Nitrias: neque est abundans mercibus: præterea longe a terra abest navium statio, lintribusque afferuntur onera et regeruntur. regnabat ibi cum proderem hæc Celebothras: alius utilior portus gentis Necanidôn, qui vocatur Barace[o]: ibi regnat Pandion, longe ab emporio

[k] Strabo, xvii. 1, reckons it six or seven days from Coptus to Myos-hormos: which however was only half as far as from Coptus to Berenice. He too speaks of this part of the journey as formerly made by night; but in his own time by day.

[l] Cf. vi. 33. 738.

[m] This would scarcely be consistent, if the Etesian winds were already blowing when they were sailing up the Nile to Coptus. But these may be understood there of the Prodromi, the time of which might be as early as July 10. The Canis ortus, alluded to ἁπλῶς here, must be understood of the most commonly received date of that phenomenon, July 20–23—(at which time too the regular Etesian winds commonly set in)—not of the Canis ortus for the latitude of Berenice, which was the same with that of Syene; for which the stated date of the phenomenon was more properly July 14 or 15 than 20 or 21.

[n] ii. 114.

[o] Cf. D'Anville, ii. 113. 115.

mediterraneo distante oppido, quod vocatur Modusa (Modura, hod. Maduré[q],) regio autem, ex qua piper monoxylis lintribus Baracen convehunt, vocatur Cottonara (hod. Canara[r]): quæ omnia gentium portuumve aut oppidorum nomina apud neminem priorum reperiuntur: quo apparet mutari locorum status.

He concludes: Ex India renavigant mense Ægyptio Tybi, incipiente nostro Decembri, aut utique Mechiris Ægyptii intra diem sextum, quod fit intra idus Januarias nostras. ita evenit ut eodem anno remeent. navigant autem ex India vento Vulturno, (a south-east wind, though the direction requires a north-west wind,) et cum intravere rubrum mare Africo vel Austro: (a south-west wind, or a south one; though the course requires a south or a south-west one.)

The same account is given in brief by Solinus also[s]: Dicendum hoc loco, quatenus ab Alexandria Ægypti pergatur in usque Indiam. Nilo vehente Copton usque etesiis flatibus cursus est: deinde terrestre iter Hydreum tenus: post transactis aliquot mansionibus Berenicen pervenitur ubi rubri maris portus est. inde Ocelis Arabiæ portus tangitur. proximum Indiæ emporium excipit Zmirim (Plin. Muziris,) infame piraticis latronibus. deinde per diversos portus Cottonare pervenitur ad quam monoxylis lintribus piper convehunt. petentes Indiam ante exortum Canis aut protinus post exortum navigia media æstate solvunt. revertentes navigant Decembri mense. secundus ex India ventus est Vulturnus; et cum ventum est in rubrum mare aut Africus aut Auster vehunt[t].

SECTION VII.—*Scheme of the Egyptian calendar, according to the above account of Pliny's.*

It is on the concluding statement contained in the preceding quotations from Pliny that De la Nauze founded his opinion. The Egyptian Tybi is there represented as beginning in December; and the 6th of Mecheir as falling within the ides of January, Jan. 13 Roman. If this means that Mecheir 6 actually fell on Jan. 13, then Mecheir 1 must have fallen on Jan. 8. And having this datum, we must suppose the entire Egyptian year, in comparison of the

[q] Cf. D'Anville, ii. 117. [r] Ibid. ii. 115. [s] liv. § 7. [t] liv. § 9, 10.

Julian, in order to be consistent with it, to have stood as follows.

Egyptian and Julian calendar—on the supposition that Mecheir 6 in the former corresponded to January 13 in the latter.

Months.			Months.		
i. Thoth	August	11.	vii. Phamenoth	February	7.
ii. Phaophi	September	10.	viii. Pharmuthi	March	9.
iii. Athyr	October	10.	ix. Pachon	April	8.
iv. Chœac	November	9.	x. Paüni	May	8.
v. Tybi	December	9.	xi. Epiphi	June	7.
vi. Mecheir	January	8.	xii. Mesore	July	7.

xiii. Epagomenæ, August 6.

It is manifest however that there would be no foundation for this arrangement unless Mecheir 6 absolutely agreed with January 13: and that could not certainly be assumed from Pliny's words merely, Quod fit intra idus Januarias nostras. We are willing however to concede this point; and to assume that Mecheir 6, at the time to which he refers, did actually agree with January 13 Roman. It follows from this admission certainly that Thoth 1 at the same time must have been falling on August 11 Roman: but it would not follow that it would always do so, or must always have done so, unless it could be proved that the coincidence of Mecheir 6 and January 13, from which we infer this of Thoth 1 and August 11 also, was proposed by Pliny as something which held good or would hold good perpetually; and not at that particular time only. Now this is an enlargement of the particular inference from the mere matter of fact, as it held good at the time to which he refers, which we are by no means justified in making. No one will say that the words of Pliny necessarily lead to such an enlarged construction of their meaning. But in order to ascertain their real construction, we must first of all say something of that part of the voyage, which he described as made from Ocelis to Muziris and to the neighbouring parts of the continent of India, by means of the wind which he called Hippalus.

SECTION VIII.—*On the discovery of the wind Hippalus, or the first application of the wind so called to the purposes of the voyage from Egypt to India; and on the time when it was made.*

We perceive that the name given by Pliny to the wind, of which the merchants and sailors from Egypt to India in his time took advantage, is Hippalus; and that at the outset of his account he represents this wind Hippalus as another name for the wind which the Latin language usually expressed by the name of Favonius, and the Greek would no doubt have expressed in like manner by Ζέφυρος: but he does not tell us why the Latin Favonius was so called, and why the name of Hippalus was peculiar to it in the Red sea, and not given to it any where else. To supply this omission in his account, we must go to that of the anonymous author of the Periplus Maris Erythræi; and we shall find the necessary explanation there: Τοῦτον δὲ ὅλον τὸν εἰρημένον περίπλουν, says he[u], ἀπὸ Κάνης καὶ εὐδαίμονος Ἀραβίας οἱ μὲν μικροτέροις πλοίοις περικολπίζοντες ἔπλεον· πρῶτος δὲ Ἵππαλος κυβερνήτης κατανοήσας τὴν θέσιν τῶν ἐμπορίων καὶ τὸ σχῆμα τῆς θαλάσσης τὸν διὰ πελάγους ἐξεῦρε πλοῦν· ἀφ' οὗ καὶ τοπικῶς (ὁ) ἐκ τῶν (ἀπὸ) τοῦ ὠκεανοῦ φυσώντων (ἀνέμων), τῶν κατὰ καιρὸν τῶν παρ' ἡμῖν ἐτησίων, ἐν τῷ Ἰνδικῷ πελάγει, (ὃς) Λιβόνοτος φαίνεται, προσονομάζεται· ἀπὸ τῆς προσηγορίας τοῦ πρώτως εὑρηκότος τὸν διαπλοῦν.

It thus appears that Hippalus was the name of a pilot, accustomed to navigate these seas; who did not indeed discover the regularity of the wind which moderns call the monsoon in the Red sea and the Indian Ocean, and which blows for a certain part of the year, i. e. from May to October, from the south-west, and for the opposite part of the year from the north-east[v]; but was the first to take advantage of it, by sailing across the sea from Ocelis to the continent of India, instead of following the old track along the line of the coast: for which reason, his contemporaries very properly gave this wind itself the name of Hippalus; and posterity, in Pliny's

u Geographi Minores, i. Arriani Periplus Maris Erythræi, p. 52.

v Cf. Arrian, De Expeditione Alex. vi. xxi.

time and in that of the author of the Periplus, very properly retained the name so given.

The same author proceeds: Ἀφ' οὗ μέχρι καὶ νῦν, τινὲς μὲν εὐθὺς ἀπὸ Κάνης τινὲς δὲ ἀπὸ τῶν Ἀρωμάτων ἀφιέντες, οἱ μὲν εἰς Λιμυρικὴν πλέοντες ἐπὶ πλέον τραχηλίζοντες, οἱ δὲ εἰς Βαρύγαζαν, οἱ δὲ εἰς Σκυθίαν, (localities previously mentioned and described by him [v],) οὐ πλέον ἢ τρεῖς ἡμέρας ἀντέχουσι (sc. τῷ ἀνέμῳ·) καὶ τὸ λοιπὸν παρεπιφόρον πρὸς ἴδιον δρόμον (ἔχοντες αὐτὸν) ἐκ τῆς χώρας ὑψηλοὶ διὰ τῆς ἔξωθεν γῆς παραπλέουσι τοὺς εἰρημένους κόλπους.

The question then, which next presents itself is *this:* At what time was this first voyage, across the Indian Ocean, thus made by Hippalus? It is clear it had been made before the date of Pliny's natural history, which was A. D. 75 and 76 [w]; and before that of the Periplus, concerning which something will be said by and by: yet it is evidently to be inferred from Pliny's own words in speaking of the course of the voyage so pointed out for the first time: Quæ his annis comperta servatur hodie [x]; that it could not have been made long before the time when he himself was writing.

Now as the first step to an approximation to the actual date of this first voyage, we may refer to another passage of Pliny, relating to the island of Taprobana, the modern Ceylon [y]; and not, as some have imagined, the modern Sumatra [z]: "Hactenus a priscis memorata; nobis diligentior notitia Claudii principatu contigit, legatis etiam ex insula advectis. id accidit hoc modo. Annii Plocami qui maris rubri vectigal a fisco redemerat libertus circa Arabiam navigans Aquilonibus raptus præter Carmaniam xv° die Hippuros portum ejus invectus, hospitali regis clementia, sex mensium tempore imbutus alloquio, percontanti postea narravit Romanos et Cæsarem [a]." This account is repeated by Solinus [b].

It appears to us a just inference from this passage, that the use of the trade-wind Hippalus had not yet been discovered when this incident happened; and yet notwithstand-

[v] Cf. D'Anville, ii. 113–115.

[w] Cf. our Dissertations, Diss. xv. vol. ii. p. 77: Appendix, Diss. xvii. vol. iv. 82 sqq.

[x] vi. 26.

[y] D'Anville, ii. 117.

[z] Cf. Acosta, Historie of the Indies, cap. i. 16. p. 55: 19. 62: ii. 9. 102; translated by E. G., Lond. 1604.

[a] H. N. vi. 24. 642. Cf. Strabo, xv. 1.

[b] liii. § 8–10.

ing was discovered soon after, and consequently in the reign of Claudius: especially if Taprobana was really the same as the modern island of Ceylon, and therefore situated so near to Modusa or Modura, the capital of the kingdom of Pandion, (mentioned supra[c], as the principal mart of the commerce carried on with India by means of this wind,) that, after the beginning of a stated and regular intercourse between Egypt and those parts by means of this same wind, it is morally impossible that Taprobana, even though entirely unknown before, could long have continued so.

We may further infer that Taprobana had not yet been visited by any Roman, or was not yet known to have been so, up to a certain time in the reign of Claudius; from the allusion to it in Pomponius Mela, an older writer than Pliny, and one of the authorities to which he refers in his sixth book itself. Now when Mela was writing nothing was known of Taprobana for certain: Taprobane aut grandis admodum insula, aut prima pars orbis alterius Hipparcho dicitur. sed quia habitatur nec quisquam circum eam isse traditur prope verum est[d].

It is not often that the date of any work of antiquity can be determined with so much precision as that of this of Mela. He quotes Cornelius Nepos: Ut recentem ita auctoritate certum[e]: he describes Herculaneum and Pompeii as still existing in his own time[f]: he mentions the Phœnix and its period[g], yet not the appearance of one in the reign of Claudius, U. C. 800 A. D. 47: he speaks of the human sacrifices of the Gauls, i. e. of the religion of the Druids, as Feritatis jam abolitæ[h]: and it also was suppressed by Claudius[i]. But the passage which ascertains the date of his work is the following[k]: Britannia qualis sit qualesque progeneret, mox certiora et magis explorata dicentur. quippe tam diu clausam aperit ecce! principum maximus: nec indomitarum modo ante se verum ignotarum quoque gentium victor, propriarum rerum fidem ut bello affectavit ita triumpho declaraturus portat.

This part of his work then was written just as it was known

c Page 485.
d iii. 7.
e iii. 5.
f ii. 4.
g iii. 8.
h iii. 2.
i Suetonius, Claudius, xxv. 14.
k iii. 6.

that Claudius was returning from his British expedition to his triumph. Now it appears from Dio[l], that Vitellius (his colleague in the consulship A. D. 43) was left in command at Rome, while he went himself on this expedition; and that Claudius and Vitellius were in office together *ἑξάμηνον*, that is, from January 1 to July 1, A. D. 43. If so, he must have set out before July 1, A. D. 43. He was sixteen days only in Britain, and six months only absent from Rome[m]: and he had returned, and was celebrating his triumph, Coss. Caio Crispo ii. Tito Statilio Tauro: i. e. after Jan. 1, A. D. 44. It may be collected from Suetonius[n], that he both returned and triumphed *sexto mense* after his departure. The date therefore of his triumph must have been either the very end of A. D. 43 or the very beginning of A. D. 44: that of Mela's allusion to it consequently must have been just before; and most probably the very end of A. D. 43.

The discovery of Taprobana then by the freedman of Annius Plocamus had not yet been made in the third of Claudius, A. D. 43, or was not yet known to have been made. Mela is silent also concerning the wind Hippalus: and therefore it is to be presumed he knew nothing as yet of that too. Now the reign of Claudius lasted from January 24 A. D. 41 to October 13 A. D. 54. In the first year of his reign, Nab. 789, A. D. 41, the first of Thoth fell on August 13: in the last, Nab. 802, A. D. 54, it fell on August 10. Between these extremes there were four years, Nab. 796 A. D. 48–Nab. 799 A. D. 51; in each of which it fell on August 11. It is evidently possible that the first voyage to India, made with the help of the wind Hippalus, and made in the reign of Claudius, might actually be made in the course of these four years: in which case the dates above-mentioned of Tybi, and of Mecheir 6, reduced to the Julian calendar, would necessarily correspond, as we have seen they did, Tybi to December, Mecheir 6 to January 13. It is probable that Pliny found these dates in some of the earliest accounts of the voyage; in which the Egyptian days of the month had been reduced to the Roman also—to the effect which we have just

[l] lx. 21. [m] lx. 23. [n] Claudius, xvii. 3: xxi. 12. Conf. Pliny, H. N. iii. 20. p. 710: xxxiii. 16. p. 80; Galba, vii. 2: Vitellius, ii. 8, 9; Vespasian, iv. 2; Josephus, Bell. Jud. iii. i. 2.

described *: though what his particular authority for this part of his accounts was, it would be useless to conjecture, further than that it must have been some one of those whom he enumerates in his first Book [o], as the authorities followed in this sixth Book; and most probably one of the Exteri. It must be admitted however that this is the most natural and consistent explanation of these particular dates; viz. that they were taken from the equable Egyptian calendar for the time being. And it is a strong internal evidence of the truth of this explanation, that just at the time when this new route to India must have been discovered, and when the first and most interesting accounts of it were likely to be written, the equable Thoth was actually coinciding with August 11. These first accounts were most likely to be given by the Egyptians, or by the Greeks of Egypt; the intercourse itself thus carried on being between Egypt and India: and therefore the dates which occurred in them would very probably be specified in terms of the Egyptian calendar; which nevertheless might also have been reduced to the Roman, for the benefit of Roman merchants, or of other Roman subjects, who were as much concerned in the commerce with India as the Egyptians.

Section IX.—*On the date of the Periplus Maris Erythræi.*

With regard to the author of this Periplus, which has been ascribed to Arrian, a very slight perusal of it is sufficient to convince us that he must have been a native of Egypt,

* It is to be observed that during these four years, A. D. 48–51, and even from A. D. 46 or 47, the relation of the Roman calendar to the Julian, properly so called, was such that the kalends of the Roman months fell on the second of the corresponding Julian months. This would make no difference to the relation of a given equable date to a given Julian one in any of these years: but it would to the relation of a given equable date to a given Roman one. For example, the Ides of January, in any of these years, Jan. 13 Roman, corresponded to Jan. 14 Julian; but Mecheir 6 to Jan. 13 Julian, and therefore to Pridie idus Januarias Roman. Now the relation of Mecheir 6 to the corresponding Roman date, under such circumstances, could scarcely be more properly expressed than it was by Pliny, *loc. cit.*, Quod fit *intra* idus Januarias nostras—as a day which came close up to, but did not pass beyond, or even coincide with, Jan. 13, the ides themselves.

o p. 45.

whereas Arrian was a Bithynian; and that he was probably an Alexandrine Greek. That he was an Egyptian appears from his own testimony[r]: *Ἔστιν δὲ τὰ δένδρα τὰ λιβανοφόρα οὐ μεγάλα λίαν οὐδὲ ὑψηλά· φέρει δὲ ἐπὶ τῷ φλοίῳ πησσόμενον τὸν λίβανον, ὥς τινα καὶ τῶν παρ' ἡμῖν ἐν Αἰγύπτῳ δένδρων δακρύει τὸ κομμί.* That he was probably an Alexandrine may be inferred from his having written his work in Greek; and from his dates, which are all taken from the Alexandrine or from the Roman calendar.

Thus, where he is describing the region, on the right hand of the navigator, in sailing down the Sinus Arabicus from Berenice to the port or emporium of Adulei, in the dominions of Zoscales mentioned just before[s], as a contemporary: *Τὰ δὲ πλεῖστα ἐκ τῆς Αἰγύπτου φέρεται εἰς τὸ ἐμπόριον τοῦτο ἀπὸ μηνὸς Ἰανουαρίου μέχρι τοῦ Σεπτεμβρίου, ὅ ἐστιν ἀπὸ Τυβὶ ἕως Θώθ· εὐκαίρως δὲ ἀπὸ Αἰγύπτου ἀνάγονται περὶ τὸν Σεπτέμβριον μῆνα*[t]. Here we should perhaps read *ἐπὶ Αἰγύπτου* for *ἀπὸ Αἰγύπτου*: understanding him to mean that September or Thoth was a good time for returning from those parts to Egypt. The relative position of Adulis and Alexandria one to the other respectively shews that a south wind would be wanted for that purpose: and as the Etesian winds ceased about the first of September, the south winds, by which they were commonly succeeded, in general must have begun soon after. This correspondence however of Tybi to January, and of Thoth to September, could hold good only of the Alexandrine and of the Roman calendar.

Again, speaking of certain other ports, Opone, Tabæ, and the Aromatum emporium, (all lying on the African not on the Arabian side of the coast, and at the most northernly point of the coast on the Red sea,) he observes[u]: *Πλεῖται δὲ εἰς πάντα ταῦτα τὰ πέραν ἐμπόρια ἀπὸ μὲν Αἰγύπτου περὶ τὸν Ἰούλιον μῆνα, ὅ ἐστιν Ἐπιφί.* The Alexandrine Epiphi bore date June 25—July 25. Again, speaking of the harbour of Muza, 1200 stades south of Berenice[w], he observes: *Πλεῖται δὲ εἰς αὐτὸν εὐκαίρως περὶ τὸν Σεπτέμβριον μῆνα ὅς ἐστι Θὼθ, οὐδὲν δὲ κωλύει καὶ τάχιον.* Thoth, it should be remembered,

[r] Geographi Min. i. 16.
[s] Ibid. p. 3. ad calcem.
[t] Ibid. 5.
[u] Page 8.
[w] Page 12–14. Cf. Pliny, H. N. vi. 26. 669, and supra, 484.

was the Alexandrine form of the Egyptian Thoÿth or Θωὺθ. Again, he remarks on the harbour of Cane, (north-east of the entrance of the Red sea from the Arabian Gulf, higher up the coast of Arabia Felix[x];) *Πλεῖται δὲ εἰς αὐτὴν περὶ τὸν αὐτὸν καιρὸν ὃν καὶ εἰς Μούζα, πρωϊμώτερον δέ.* And speaking of the arrival of the Indian fleet, or of some part of it, on its way back, at an emporium called Minnagara, in the country of the Scythæ, subject to the Parthians, he observes[y]: *Ἀνάγονται δὲ καὶ αὐτοὶ (εἰς αὐτὸν) οἱ πλέοντες μετὰ τῶν Ἰνδικῶν περὶ τὸν Ἰούλιον μῆνα ὅς ἐστιν Ἐπιφί.* So again, of the port of Barygaza in India, and of the time of setting out to it from Egypt[z]: *Ἀποπλέουσι δὲ κατὰ καιρὸν οἱ ἀπὸ Αἰγύπτου εἰς τὸ ἐμπόριον ἀναγόμενοι περὶ τὸν Ἰούλιον μῆνα ὅς ἐστιν Ἐπιφί.* Lastly, he observes of Nelkynda[a]: *Πλέουσι δ' εἰς αὐτὴν οἱ κατὰ καιρὸν ἀναγόμενοι ἀπ' Αἰγύπτου περὶ τὸν Ἰούλιον μῆνα ὅς ἐστιν Ἐπιφί:* all which statements, being understood of the time of setting out from Berenice on the Red sea, would be consistent with the account of Pliny, who specified the stated time for the same purpose as not later than July 20 at least; that is, not later than the Alexandrine month Epiphi.

It appears further not merely from the internal evidence of the work itself throughout, but also from p. 12 in particular, that the author was some one who had himself made the voyage which he describes, and was personally acquainted with the route: *Διὸ καὶ εἰσπλεόντων μέσον πλοῦν κατέχομεν, καὶ εἰς τὴν Ἀραβικὴν χώραν μᾶλλον παροξύνομεν, ἄχρι τῆς κατακεκαυμένης νήσου.*

With regard to his age, it may probably be collected from the following intimations. He mentions the expedition of *Cæsar* (i. e. Augustus, as the necessity of the case requires him to mean) against Arabia, as but a little before his own time. He was speaking previously of Ocelis and of Arabia Felix[b]: *Εὐδαίμων δὲ ἐπεκλήθη πρότερον οὖσα πόλις, ὅτι μήπω ἀπὸ τῆς Ἰνδικῆς εἰς τὴν Αἴγυπτον ἐρχομένων, μηδὲ ἀπὸ Αἰγύπτου τολμώντων εἰς τοὺς ἔσω τόπους διαίρειν, ἀλλ' ἄχρι ταύτης παραγινομένων, τοὺς παρὰ ἀμφοτέρων φόρτους ἀπεδέχετο· ὥσπερ Ἀλεξάνδρεια καὶ τῶν ἔξωθεν καὶ τῶν ἀπὸ τῆς Αἰγύπτου φερομένων ἀποδέχεται. νῦν δὲ οὐ πρὸ πολλοῦ τῶν ἡμετέρων χρόνων Καῖσαρ αὐτὴν κατεστρέψατο.*

x Ibid. 16: cf. 15.
y Ibid. 22: cf. 33.
z Ib. 29.
a Ibid. 31, 32: cf. D'Anville, ii. 115.
b Page 14.

This was the expedition of Ælius Gallus, U. C. 730 and 731, of which Strabo has given the most particular account[c]. The Λευκὴ Κώμη or Albus Pagus was one of the places occupied by the Romans on that occasion: and this too is mentioned in the Periplus[d]: Ὅρμος ἐστὶν ἕτερος καὶ φρούριον, ὃ λέγεται Λευκὴ Κώμη, δι' ἧς ἐστιν εἰς Πέτραν (ἡ ὁδὸς) πρὸς Μαλίχαν βασιλέα Ναβαταίων[e].

Many places are mentioned by him in common with Pliny: Ocelis[f], Cane or Cana[g], Muza[h], Aphar[i], (Pliny, Saphar) Saue: Muziris[k], (Pliny, Muziris, Solinus, Zmurim:) Nelkynda[l], (Pliny, Necanidôn:) Βαράκης[m], (Pliny, Barace:) &c. It appears in fact that he must have been a contemporary of Pliny's: for as Pliny observed of Muziris, Regnabat ibi cum proderem hæc Celebothras, so does this author observe of the places mentioned by him[n]: Καὶ μετὰ ταῦτα Μούζιρις καὶ Νέλκυνδα αἱ νῦν πράσσουσαι, (i. e. negotiantes, mercantes, mercaturam exercentes: ports where the Indian commerce in his own time was principally carried on;) βασιλείας δ' ἐστὶν ἡ μὲν Τύνδις (lege Νέλκυνδα) Κηπροβάτου, (the Celebothras of Pliny,) ἡ δὲ Μούζιρις[o] βασιλείας μὲν τῆς αὐτῆς, κ', τ. λ. And as a king called Pandion was reigning over the Necanidæ in the time of Pliny, so was one of the same name reigning at Nelkynda in the time of this author. He adds[p], Ἡ δὲ Νέλκυνδα σταδίους μὲν ἀπὸ Μουζίρεως ἀπέχει σχεδὸν πεντακοσίους ὁμοίως διά τε ποταμοῦ καὶ πεζῇ καὶ διὰ θαλάττης· βασιλείας δέ ἐστιν ἑτέρας, τῆς Πανδίονος. He mentions this Pandion again, speaking of the quarter called the Παραλία[q]: Ἐν ᾗ καὶ κολόμβησίς ἐστιν ὑπὸ τὸν βασιλέα Πανδίονα πινικοῦ, (a pearl fishery,) καὶ πόλις ἡ λεγομένη Κόλχοι: and so again, a little further on[r]. We must not however confound the Indian king of this name, and of

c xvi. 4. They arrived at Λευκὴ Κώμη on the 15th day after they set out from Cleopatris, one of the διώρυχες of the Nile, and spent the first summer and winter there in restoring the sick. See our Dissertations, Diss. v. vol. i. 252–259.

d Page 11.

e Strabo, xvi. 4: Ἐκ μὲν οὖν τῆς Λευκῆς Κώμης εἰς Πέτραν ἐντεῦθεν δ' εἰς Ῥινοκόλουραν τῆς πρὸς Αἰγύπτῳ Φοινίκης τὰ φορτία κομίζεται, κἀντεῦθεν εἰς τοὺς ἄλλους. νυνὶ δὲ τὸ πλέον εἰς τὴν Ἀλεξάνδρειαν τῷ Νείλῳ κατάγεται, τὰ δ' ἐκ τῆς Ἀραβίας καὶ τῆς Ἰνδικῆς εἰς Μυὸς ὅρμον· εἶθ' ὑπέρθεσις εἰς Κόπτον τῆς Θηβαΐδος καμήλοις, ἢ διώρυχι τοῦ Νείλου εἰς Ἀλεξανδρείαν. Cf. Pliny, H. N. vi. 32. 714. De Petra: Diodorus Sic. iii. 42.

f 14. g 15. h 13.

i 13. k 30, 31. l 31, 32.

m 23, 24. n 30.

o Muziris is mentioned in Lucian, ii. 43: Quomodo historia conscribenda sit, cap. 31. l. 70.

p 31.

q Page 33. r Ibid. 33, 34.

these times, with the king (though he also is so called) who sent the embassy to Augustus, which he received at Antioch, B.C. 20[s]; for that king appears to have been more truly called Porus: though he may have been the same who is mentioned in the geography of Ptolemy in connection with Modura, (in Pliny Modusa:) Μόδουρα, βασίλειον Πανδίονος[t].

When therefore this author, speaking of Muza, Aphar[u], and the neighbouring regions, specifies Χαριβαὴλ, or Charibaal, by name, as one who was careful to keep up a good understanding *with the emperors*; we cannot suppose this to allude to Marcus Aurelius and Lucius Verus, as Dodwell would have us to do, an hundred years later than the time of Pliny and of this writer, but we may understand it of Vespasian and of Titus Cæsar, who was *bona fide* associated with his father in the empire, whether he was nominally so or not; and with whom both Pliny and this writer were strictly contemporary: Ὑπέρκειται δὲ αὐτῆς (sc. Muza) ἀπὸ τριῶν ἡμερῶν πόλις Σαύη, τῆς περὶ αὐτὴν Μαφαριτίδος λεγομένης χώρας. ἔστιν δὲ τύραννος, καὶ κατοικῶν αὐτὴν, Χόλαιβος. καὶ μετ' ἄλλας ἐννέα ἡμέρας Ἄφαρ μητρόπολις, ἐν ᾗ Χαριβαὴλ ἔνθεσμος βασιλεὺς ἐθνῶν δύο, τοῦ τε Ὁμηρίτου καὶ τοῦ παρακειμένου λεγομένου Σαβαείτου, συνεχέσι πρεσβείαις καὶ δώροις φίλος τῶν αὐτοκρατόρων. These regions at present make a part of the Hedjaz or holy land of Arabia. Charibaal is mentioned again[x], and along with him the contemporary king, described as the tyrant reigning in the Mapharitis[y].

Section X.—*On the Coptic calendar.*

The Coptic calendar, as the name implies, is the calendar of the Copts. And by the Copts we are to understand the Christian part of the native Egyptians; those descendants of the Egyptians of former times who retain the profession of Christianity in the midst of the Mahommedans of Egypt; of the Turkish or the Arabic, or even the native, population of the same country.

Respecting the origin of this appellation opinions vary. It is an obvious conjecture to derive the name of Copt from the

s Dio, liv. 9. 7: Florus, iv. xii. § 62. Strabo, xv. i. ad fin.

t Lib. vii. cap. i. § 89. Cf. also § 6–8. 9. 11. Lib. vi. cap. 7. § 7. 10.

u Page 13.

x Page 14.

y Ibid. 18.

ancient Coptos, which survives under the same name, and where the greatest part of the remnant of the old Egyptians are said to reside at present. This explanation is proposed by the authors of the Universal History; and Mr. Ideler, in his Arabian chronology, has adopted it. The question itself is not of any importance: but we are more disposed ourselves to concur in the opinion of Scaliger[z]; who derives this term from the modern designation of the native Christians of Egypt, *Kupti:* for that might be traced up to their proper denomination of Αἰγύπτιοι, pronounced as Aiguptii. In the Æthiopic the word for the Christians of Egypt is Giptu or Gibbetu; and the Mahommedans, according to Scaliger, call them *El-Chibth,* which, as he observes, is much the same as El-Cupti.

By the Coptic calendar however, we are to understand the proper solar and Julian calendar of the Christians of Egypt, in contradistinction to the lunar calendar of Hej'ra peculiar to the Mahommedans of that country, as to the Mahommedans every where else. Not that this solar and Julian calendar of the Christians of Egypt is confined to them; and is not used even by the learned among the Mahommedans themselves, for literary and scientific purposes. This Coptic calendar is the modern representative of the old Alexandrine calendar, of which we have just given an account. There is no difference between them except in the orthography and pronunciation of the names of the months; which are not altogether the same in the Coptic calendar at present as in the ancient Alexandrine. But in any essential respect there is not the slightest difference between them; and the scheme or type, already proposed of the Alexandrine[a], *mutatis mutandis* is competent to serve for the Coptic.

SECTION XI.—*On the names of the months in the modern Egyptian or Coptic calendar.*

The names of the months in the Coptic calendar are most commonly found in Arabian, Turkish, or Persian writers, who did not know how to pronounce and to write them correctly; and it seldom happens that in any two of these Oriental authorities are they written in the same manner:

z De Emendatione, vii. 705. C D: iv. 239. C. a Supra, p. 477.

while in all they are seen to be more or less altered and changed, and therefore corrupted, in comparison of their old and genuine orthography and pronunciation. As a specimen of this diversity, we will exhibit the names of the months in this calendar, as we find them given in the Menologium of Fabricius[b], in Scaliger, De Emendatione[c], in Ludolf, Commentarius ad Historiam Æthiopicam[d], in the Golden Meadows of Masoudy[e], by Schemseddin[f], and in the Ephemerides of Beck[g], and by Golius ad Alferganum[gg].

Names of the months in the Coptic calendar according to various authorities.

	Fabricius	*Scaliger*	*Ludolf*	*Masoudy*	*Schemseddin*	*Beck*	*Golius*
i	Tot	Thoth	Tot	Tot	Thoth	Thoht	
ii	Baba	Papa	Baba	Baba	Paopi	Babe	Baba
iii	Hatur	Hathur	Hatur	Hatour	Ator	Hathur	
iv	Chiahac Kaihac	Chiach	Chiahac	Kaïouk	Choïac	Chihak	Kaihac
v	Tuba Tube	Tuba	Tuba	Thouba	Tobi	Tube	Touba
vi	Amschîr	Amschir	Amschir	Aschir	Imschir or Mékhir	Amschir	Amxîr
vii	Barmehât	Parmahath	Bermahat	Yarmhat	Faménot	Barmehath	Barmehât
viii	Barmoudah	Parmudah	Bermoda	Yarmouda	Barmoudi or Farmoudi	Barmude	Barmouda
ix	Bashansh Bashnis Beschnesch	Paschunes	Bashansh	Baschnusch	Paschons	Baschnes	Bashnis
x	Baune Bouna	Peuni	Baune	Bouna	Paoni	Bune	Bouna
xi	Abii Abib	Epip	Abib	Abib	Abib Epiphi	Ebib	Abib
xii	Massari Musri	Musri	Massari	Masra	Mésori	Mesri	
xiii	Al Nisi	Nisi	Nissi	5 Epagomenæ		Epagomenæ	Nesi

In the representation however of the names of the months in their own calendar, by the learned and more intelligent of the Coptic Christians themselves, there is no more of difference from the standard of antiquity than is easily to be

b xxi. p. 26.

c Lib. vii. 705. A–D. cf. iv. 238. C. D.

d Pag. 389–427.

e Notices et Extraits, tome i. p. 30.

f Ibid. tome i. 256–263.

g Lib. i. ii. § 6. p. 6.

gg Pag. 43, 44.

accounted for by the lapse of time, or than was naturally to be expected from that cause alone. Thus, as Mr. Ideler observes in his Arabian chronology, a Coptic calendar was found by La Croze in a MS. translation of the Gospels into the Coptic language by Michael bishop of Damietta, A.D. 1179: and how little the names of the months in that differed from those in the old style of the Alexandrine calendar will appear from the following comparison.

Alexandrine calendar, B.C. 26.	*Coptic calendar,* A.D. 1179.
Names of the months.	Names of the months.
i Thoth	i Thout
ii Phaophi	ii Paophi
iii Athyr	iii Athir
iv Chœac	iv Choiak
v Tybi	v Tibi
vi Mecheir	vi Mechir
vii Phamenoth	vii Phamenoth
viii Pharmuthi	viii Pharmuthi
ix Pachon	ix Paschons
x Paüni	x Paöni
xi Epiphi	xi Epip
xii Mesore or Mesori	xii Mesori

In many of the schemes of the Coptic calendar, such as we have proposed above, the five epagomenæ appear at the end under the name of Nisi, Nissi, or Νεισί[h]. This word Nisi is of Arabian origin, and would be more correctly written *Nesi*. Golius, ad Alferganum[i], observes, Ceterum Arabes et qui eorum lingua utuntur quinque hosce anni Ægyptiaci uti et Persici adjectitios dies peculiari nomine . . . *Nesi* indigitant; quod ab Arabibus Paganismi tempore adjectitio seu embolimæo mensi suo inditum fuisse supra diximus. The root of this word in the Arabic is a verb which properly means *retardare, to delay* or *procrastinate;* but why that came also in the course of time to be used in the sense of *to intercalate* could not be explained at present, without going into the history of the lunar Arabian calendar, older than that of Hej'ra; and

h Ludolf, Comm. p. 437. No. lxvii. Scaliger, De Emendatione, iv. 239. Beck, Ephemerides, i. ii. § 7. p. 6. Selden, Opp. i. 1871. De Synedriis, iii. xv.

i Pag. 44.

into that of the peculiar rule of its administration. There can be little doubt that this name Nesi or Nisi, for the five epagomenæ, passed into the Coptic calendar from the Arabians. Thus an Arabian author is quoted by Ludolf[k], after Kircher, who describes this calendar as follows: Menses Coptitarum (sunt) duodecim. annus eorum (constat) trecentis sexaginta quinque diebus: et quinque (diebus) *Nisi*; et die ἐμβολιμαίῳ (intercalari) in omni quarto anno. But in the Alexandrine calendar, as we have often observed, these five days had no name, except that of the five epagomenæ, that is, the *superinductive* days, in general: and in a Coptic account of the calendar, also quoted by Ludolf[k], from the same authority, they were still described only as the five days of addition: Menses Ægyptiorum (sunt) xii, et v sunt epagomenæ, (quæ est) quinque dierum ἐπίθεσις (additio) singulis quatuor annis. This word, ἐπαγόμεναι or epagomenæ, according to Mr. Ideler[l], was treated by Alfergan as if it was a proper name, peculiar to the Egyptian language, and written Abûgomene. In the Ethiopic it has certainly assumed the form of Pagomen: and, according to Scaliger[m], Albatanius expressed it by Lagnahir. If the Coptic calendar however has any thing like a proper name for these five appendices, it is that of mensis minor or mensis parvus[n], "the little month;" in the Arabic El Shahir El Saghu[o]: which is probably the Lagnahir of Albatanius also.

k Comm. 437. No. lxvii. 5, 6.

l Arabian chronology.

m De Emendatione, iv. 239. C.

n Selden, opp. i. 1871, De Synedriis iii. cap. xv.

o La Croze, apud Ideler, loc. cit. In Psellus (Astronomia, p. 62. Parisiis. 1545) the name of ἐπαγόμενος (μὴν) is given to these five days. Οἱ δὲ Αἰγύπτιοι μῆνες, says he, εἰσὶν οὗτοι. Θώθ. Φαωφί. Ἀθύρ. Χοιάκ. Τυβί. Μεχείρ. Φαμενώθ. Φαρμουθί. Παχών. Παῦνί. Ἐπιφί. Μωσωρί (Μεσορί.) Ἐπαγόμενος, ὅστις καὶ πενθήμερός ἐστιν ἐν τρισὶν ἔτεσιν· ἐν δὲ τῷ τετάρτῳ, τῷ καὶ βισέξτῳ, ἑξήμερος.

SECTION XII.—*Examples of the use of the modern Alexandrine or Coptic calendar.*

Table of the modern Alexandrine or Coptic calendar.

	Months.	Days.	⊙ of leap-yr.		⊙ of leap-yr.	
i	Thout	30	i.	Aug. 30	ii. iii. iv.	Aug. 29
ii	Paophi	30	—	Sept. 29	——	Sept. 28
iii	Athir	30	—	Oct. 29	——	Oct. 28
iv	Choiak	30	—	Nov. 28	——	Nov. 27
v	Tibi	30	—	Dec. 28	——	Dec. 27
vi	Mechir	30	—	Jan. 27	——	Jan. 26
vii	Phamenoth	30	—	Feb. 26	——	Feb. 25
viii	Pharmuthi	30	—	Mar. 27	——	Mar. 27
ix	Paschons	30	—	April 26	——	April 26
x	Paöni	30	—	May 26	——	May 26
xi	Epip	30	—	June 25	——	June 25
xii	Mesori	30	—	July 25	——	July 25
xiii	Mensis minor, El Nesi,	5 6	i. ii. iii. iv.	Aug. 24		Aug. 24

The modern Julian calendar of Syria is so often used in conjunction with this modern Julian calendar of Egypt, or Coptic calendar, that it is desirable to exhibit the type of the former along with this of the latter, for the sake of the illustration of either by means of the other. This Syrian calendar agrees with the Julian in all respects except the names of the months and the beginning of the year; which in the Syrian calendar is reckoned from Teschrin Prior, October 1.

Modern Syrian calendar.

	Months.	Days.	
i	Teschrin Prior	31	Oct. 1
ii	Teschrin Posterior	30	Nov. 1
iii	Canûn Prior	31	Dec. 1
iv	Canûn Posterior	31	Jan. 1
v	Asbat, Shabat, or Shebat	28 or 29	Feb. 1
vi	Adar	31	Mar. 1
vii	Nisân	30	April 1
viii	Aiyâr or Jiar	31	May 1
ix	Hazirân	30	June 1
x	Tamûz or Tammûz	31	July 1
xi	Ab or Aab	31	Aug. 1
xii	Eilûl, Ilûl, or Elûl	30	Sept. 1

Schemseddin, an Arabian writer, of Egypt, (whose age appears to have been Hej. 1055 A. D. 1645–1646,) author of a rural and astronomical calendar relating to Egypt[p], supplies a variety of dates in terms of both these calendars; from either of which, if known, the others are determinable also. The following are specimens of them.

Coptic and Syrian dates, compared by Schemseddin, cir. A. D. 1645.

Page.		Coptic.		Syrian.	Julian.
256	4	Thoth	1	E'lul	Sept. 1
258	4	Paopi	1	Tishrin-E'wel or Prior	Oct. 1
259	5	Ator or Athir	1	Tischrin-Thani or Posterior	Nov. 1
259	5	Choïac	1	Canoun-E'wel or Prior	Dec. 1
—	6	Tobi	1	Canoun-Thani or Posterior	Jan. 1
260	6 (7)	Imschir or Mekhir	1	Schebât	Feb. 1
		* * *		* * *	
261	6	Barmoudi or Farmoudi	1	Nisân	April 1
262	6	Paschons	1	Iyyar	May 1
		* * *		* * *	
263	7	Abib or Epiphi	1	Tammuz	July 1
—	8	Mésori	1	Ab	Aug. 1

Astronomical dates, in terms of the lunar calendar of Hej'ra, of the Julian Syrian, and of the Coptic, respectively: from the Hakémite tables of Aboûl-hassan Ibn Iounis[q].

i. Page 182. Solar eclipse, observed at Cairo by Ibn Iounis.

Saturday, 29 Shoual	Hej'ra 367.
8 Haziran	Alex. / Æra Sel. } 1289.
14 Bouneh or Paüni	Æra of Diocl. 694.

June 8 A. D. 978.

Pingré, ⊙ eclipsed June 8 o P. M. A. D. 978. Paris.

ii. Page 184. Lunar eclipse, observed at Cairo.

Night of Thursday, 13 Rabi ii.	Hej. 369.
7 Tishrin 2.	Alex. 1291.
10 Athir	Dioclet. 696.

Nov. *6 A. D. 979. Dom. Let. E.

Pingré ☽ Nov. 6 9. 30. P. M. Paris.

* As this eclipse happened the night before Friday, it happened, as we should say, on Thursday night. A. D. 979 Dom. Let. E. Nov. 6 was

p Notices et Extraits, i. 256. q Ibid. vol. vii. p. 16–240.

iii. Page 197. Solar Eclipse. At Cairo.

Afternoon of Monday, 29 Rabi i.	Hej. 394.
24 Canoun ii. or Posterior	Alex. 1315.
28 Tibi *	Dioclet. 720.

Jan. 24 A. D. 1004. Dom. LL. B. A.

Pingré, ⊙ eclipsed, Jan. 24. 1. P. M. Paris.

iv. Page 196. 198. Conjunction of Jupiter and Mars. At Cairo.

Monday, 14 Joumadi ii.	Hej. 377.
10 Tishrin Prior	Alex. 1299.
12 of Babé or Paophi	Dioclet. 704.

Oct. 10 A. D. 987†. Dom. L. B.

v. Page 226. Conjunction of Venus and Cor Leonis. At Cairo.

Friday, Schaban 15.	Hej'ra 393.
Haziran 18.	Alex. 1314.
Bouné or Paüni 24.	Dioclet. 719.

June 18 A. D. 1003. Dom. L. C.

vi. Page 226. 228. Conjunction of Saturn and Jupiter. At Cairo.

Noon of Friday, Safar 23.	Hej'ra 398.
7 Tishrin ii. or Posterior	Alex. 1319.
10 Athir	Dioclet. 724.

Nov. 7 A. D. 1007‡. Dom. L. E.

Thursday: and this would agree both to the 7th of Teschrin ii or Posterior, and to Athir 10, if reckoned from sunset, Nov. 6. Athir 1 however, on this principle, must be reckoned from October 28 at sunset: and that would be its date only in the first year of its proper cycle of leap-year, as A. D. 979 was.

* A. D. 1003 was the first year of the Coptic cycle; and Tibi 1 bore date Dec. 28 not Dec. 27.

† A. D. 987 too was the first year of the Coptic cycle; and Babé or Phaophi bore date Sept. 29.

‡ A. D. 1007 also was the first year of the Coptic cycle; and Athir bore date October 29.

APPENDIX TO VOL. IV.

ADDENDA ET CORRIGENDA.

CHAPTER I.

On the true Epoch of the Solar Cycle of the Fasti Catholici, and on the correction of the Epoch of the printed Tables.

THE Solar Cycle of the Fasti Catholici is the succession of mean vernal equinoxes in constant connection with the present system of things; i. e. from the date of the Mosaic creation, A. M. 1 B. C. 4004, downwards; but as adapted first and properly to the meridian of the ancient Jerusalem [a].

It will be seen from the General Tables, (Division B,) that the first ingress of this kind is assumed to have taken place on April 24, at 23 h. 48 m. 50 sec. 24 th. from midnight A. M. 1 B. C. 4004; i. e. at 11 m. 9 sec. 36 th. before the point of midnight April 25. And as 11 m. 9 sec. 36 th. is the stated difference between the mean annual time of the Tables, in the sense of mean natural, mean tropical, mean solar or mean equinoctial, and the same thing in the sense of mean Julian; it follows, on this principle, that, while the mean Julian time of the Tables must have been supposed to enter them exactly at midnight for the proper meridian, the mean natural must have been assumed to do so one mean natural year's anticipation on the mean Julian before the same point of midnight.

The actual epoch of the mean natural annual time of our own world can be nothing but the actual date of the Mosaic creation, B. C. 4004; and the actual epoch of the actual Julian time of the

[a] Introduction to the Tables, 26–29. Part i. ch. iii. art. ii. sect. i–iii.

same system of things in strictness must be the epoch of the Mosaic creation also: and yet the epoch of the mean Julian time even of this system, as measured or measurable by one and the same cycle of leap-year, (that of the actual Julian year at present,) virtually if not actually is one year earlier than the date of the Mosaic creation; B. C. 4005 not B. C. 4004[b].

Now if the mean vernal ingress B. C. 4004, for the proper meridian, took place on April 24, at 23 h. 48 m. 50 sec. 24 th. from midnight; and if the mean length of the natural year was always such as we have supposed it to be, 365 d. 5 h. 48 m. 50 sec. 24 th.; then the mean vernal ingress B. C. 4005, for the same meridian, must have taken place on April 24, at 18 hours from midnight. And in that case mean natural annual time, reckoned from the mean vernal equinox, and mean noctidiurnal time, reckoned from 18 hours after midnight according to the primitive rule, must have coincided and begun together. This consideration, as much as any thing, induced us to fix the epoch of our Solar Cycle to April 24 at 23 h. 48 m. 50 s. 24 th. from midnight, B. C. 4004; as only the necessary consequence of its being supposed to have borne date April 24 at 18 hours of mean solar time from midnight, the year before.

In the course of our work however we have seen reason to doubt of the correctness of this assumption; and to conclude that the epoch on which we ought to have fixed, as that of the entire decursus of the mean equinoctial time of our Tables, was not 11 m. 9 s. 36 th. before the point of midnight, but rather the point of midnight; and in strictness not even the point of midnight, but 0 h. 0 m. 21 sec. 36 th. exactly past the point of midnight itself. And though the discovery of the truth in this respect at so late a period in the progress of our work entails the necessity of a correction of our printed Tables in Division B; it is one so easy to be made, that it cannot detract in the slightest degree from the utility of those Tables, or from their applicability to their proper purpose perpetually.

The statement however of the nature and substance of this discovery at last shews that it turns on a very nice and critical point. It was not possible to make such a discovery by means of *a priori* considerations of any kind. It could be brought to light only by a process of a peculiar kind. The method which we have employed for that purpose has been a careful collation of the Solar Tables of

[b] Fasti Catholici, ii. 35 sqq. Diss. ix. ch. ii. Cf. 267 note, Diss. x. ch. ix. sect. vi. Introduction to the Tables, p. 25. Part i. ch. iii. i. sect. ii.

our Fasti with the most accurate modern ones of the same kind. For this was virtually and substantially to reduce the question of the epoch of our own Tables to a test and criterion which must be competent to detect even the slightest variation from the truth, which might be inherent in it; viz. that of the matter of fact. The assumptions of our own Tables may be said to rest upon an *hypothesis* of a certain kind; but the modern Tables of the same kind are founded at bottom on observation. And whatsoever demonstrates the agreement of our own Tables with the modern ones in any respect demonstrates also the agreement of our assumptions with observation; i. e. with the matter of fact. And the matter of fact, accurately and exactly ascertained itself, or as much so as in the nature of things is possible, must be competent to detect and point out any the least variation from itself in the same respects; or at least in proportion to the certainty with which it has itself been ascertained and determined.

The most generally approved Solar Tables of modern times, and the most deserving to be selected as the standard of reference and comparison in a case of this kind, appear to be those of Delambre; especially with the slight corrections even of these which have been pointed out by Bessel. We propose therefore to compare the mean equinoctial time, the mean motion in longitude, and the mean sidereal time of our own Solar Tables with those of these Tables of Delambre, subject to the corrections of Bessel; i. e. to shew first of all that the mean equinoctial time, the mean longitude, and the mean sidereal time of Delambre, by means of certain corrections, can be obtained from those of our Fasti, such as they stand, and such as they are exhibited, in the printed Tables; and that too, not merely approximately, but with absolute and rigorous exactness. If this fact can be demonstrated, the necessity of those corrections will be demonstrated also.

i. In Sir John Herschel's Outlines of Astronomy lately published, the mean vernal equinox A.D. 1828, for the meridian of Greenwich, obtained from the Solar Tables of Delambre, is dated

March 22 (NS) at 1 h. 2 m. 59·05 sec. from noon.[c]
i. e. March 22 at 13 h. 2 m. 59·05 sec. from midnight.

And we must suppose that this mean equinoctial date was carefully reduced from those Tables; because Sir John Herschel proposes it as the epoch which should be adopted of the reckoning of mean solar time in the form of mean equinoctial of which he is giving an

c § 937. P. 642, London, 1849.

account in that part of his work[d]. According to the Connaissance des Temps, the difference of meridians

		°	′	″	
Between Greenwich and Paris is	..	2	20	24	West
Between Paris and Jerusalem is	..	32	51	15	West
Consequently between Greenwich and Jerusalem is		35	11	39	West

And this would be equal to 2 h. 20 m. 46·6 sec. in mean time[e]; but we will assume it at present at 2 h. 20 m. 47 sec. exactly.

The mean length of the tropical year according to Delambre is commonly stated at 365 d·242 264[f]: but the true mean standard of Delambre in strictness is 365 d·242 263 965 9[g]. That of our Fasti is 365 d·242 25. The difference between these two for one year consequently is 0 d·000 013 965 9 = 1 sec·206 653 76; and for any number of years (N) is 0 d·000 013 965 9 × N, or 1 sec. ·206 653 76 × N. And it is manifest that, if this difference at any point of time which may be proposed, by being added to the mean equinoctial time of our own Tables at the same point of time, is found to give the mean equinoctial time of Delambre's Tables at the same point of time also; the proof of our proposition, that the mean equinoctial time of our Tables with certain corrections is competent to represent that of Delambre's, will be complete. Let this test then be applied to the mean equinox of A. D. 1828.

This year of the Vulgar Æra corresponds to A. M. 5832 of our Tables: and from the mean V. E. A. M. 1 to the mean V. E. A. M. 5832 the number of mean tropical years must have been 5831 exactly. We assume therefore N = 5831: from which we find the annual difference 0 d·000 013 965 9 × N = 0 d·081 435 162 9 or 0 d. 1 h. 57 m. 15·998 074 56 sec.

We have then A. M. 5832 A. D. 1828, for the meridian of the Tables,

			h.	m.	s.
The Tabular mean V. E.		March 8 = 20	13	14	52·8
First Correction	..		+	11	9·6
Tabular mean V. E. once corrected		March 20	13	26	2·4
Second Correction	..			+	21·6
Tabular mean V. E. twice corrected		March 20	13	26	24·0
Third Correction	.. ..	+ 2			
Tabular mean V. E. thrice corrected		March 22	13	26	24·0

[d] Cf. the Introduction to our Tables, 234. Part iii. ch. i. sect. xv.

[e] Supplementary Tables, Table xxvi. P. i. Introduction, 229. Part iii. ch. i. sect. xiii.

[f] Fasti, i. 77. Diss. ii. ch. iii. sect. iii.

[g] Mémoires de l'Académie des Sciences de l'Institut de France, xxii. Memoir of M. Biot, § 114. p. 374.

		h.	m.	s.
Tabular mean V. E. thrice corrected,	March 22	13	26	24·0
Fourth Correction, 0 d·000 013 965 9 × N =	+	1	57	15·998 074 56
Tabular mean V. E. for its own meridian, equated to Delambre's for the same,	March 22	15	23	39·998 074 56

The mean equinoctial time of our Tables, for this year A. M. 5832 A. D. 1828, having first been corrected three times for reasons peculiar to itself, is or should be, by this fourth correction, equated to that of Delambre's Tables for the same year also. And it is easy to see that, if the mean equinoctial time of our Tables is really *that* of Jerusalem perpetually, it has been so equated by this fourth correction in particular.

		h.	m.	s.
A. D. 1828 Mean V. E. according to Delambre, meridian of Greenwich,	March 22	13	2	59·05
		+ 2	20	47
Mean V. E. according to Delambre, meridian of Jerusalem, ...	March 22	15	23	46·05
Mean V. E. of A. D. 1828, of the Fasti, equated to Delambre's for its own meridian, ...	March 22	15	23	39·998
Difference				−6·052

It is manifest therefore that, if the mean equinoctial time of our Tables is that of any meridian in particular, it is that of the meridian of the ancient Jerusalem; of some meridian at least which differs from that of Greenwich by + 2 h. 20 m. 47 sec. of mean solar time exactly: and this is precisely the difference which exists or is generally assumed to exist between the meridian of Greenwich and that of the ancient Jerusalem. It is true, we have not succeeded in equating the mean equinoctial time of our Tables for their own meridian to the same thing and for the same meridian according to Delambre, within 6·052 sec. of mean solar time. There can be no doubt however that this must be an accidental difference; the explanation of which may possibly appear as we proceed. But whether it can be accounted for or not, we are still of opinion that our own calculation cannot be wrong; i. e. that the true mean equinox of A. D. 1828, for the meridian of Jerusalem, according to the standard of Delambre's Tables, could not be any thing different from that which we have obtained, in the manner above proposed, from our own Tables.

For if we multiply the mean standard of Delambre 365 d·242 263 9659 by 5831, the product is

2 129 727·641 185 162 9 d.

i. e. 2 129 727 d. 15 h. 23 m. 18·398 074 56 sec.

And if we multiply our own standard 365 d·24225 by 5831 also, the product is

2 129 727·559 75 d

i. e. 2 129 727 d. 13 h. 26 m. 2·4 sec.

We have then,

	d.	h.	m.	s.
5831 mean tropical years of the standard of Delambre, ..	2 129 727	15	23	18·398 074 56
5831 of the standard of the Fasti,	2 129 727	13	26	2·4
Difference in 5831 years,		1	57	15·998 074 56

That is, the same as before. It follows that, if the first year of this number had entered our Tables with the standard of Delambre, at 0 h. 0 m. 21·6 sec. for a given meridian A. M. 1, B.C. 4004; the 5832nd must have entered them with the same standard A. M. 5832 A. D. 1828 at 15 h. 23 m. 39·998 074 56 sec. for the same meridian: i. e. at the very time determined by our calculation *supra.*

It appears then that a perfect equation of the mean equinoctial time of our Tables, supposed to be properly that of the ancient Jerusalem, to the mean equinoctial time of Delambre's Tables, may be effected by means of *four* corrections, over and above that which is required by the difference of meridians; the meridian of Jerusalem and that of Paris or that of Greenwich. i. A correction of + 11 m. 9·6 sec.; which raises the epoch of the equinoctial time of our Tables from 11 m. 9·6 sec. before midnight to midnight exactly, ii. A correction of + 21·6 sec.; which raises it from midnight exactly to 0 h. 0 m. 21·6 sec. past midnight exactly. iii. A correction of + *two* days; which raises the Julian date of the mean vernal equinox of our Tables two terms higher in the regular order of the Julian notation of such dates. iv. A correction of + 0 d·000 013 965 9 × N; which takes into account the difference of the sum of mean solar time, contained in a given number of mean tropical years of our standard and in the same number of the standard of Delambre, respectively. It is manifest that each of these corrections is alike necessary to the result of all at last. None can be dispensed with; the least no more than the greatest. All however alike being taken into account; the mean equinoctial time of our own Tables for a given epoch is equated to that of Delambre's for the same epoch with absolute exactness: so as to make it the same thing whether the mean equinoctial time of the assigned epoch had been brought down until then from the proper epoch of our own Tables in the standard of the Fasti or in that of Delambre. We cannot therefore but draw the inference which spontaneously suggests itself from this fact; viz. that, if the mean equinoctial time of our Tables is properly

that of Jerusalem, (as it appears to be,) its true epoch was not 11 m. 9·6 sec. before midnight, A. M. 1, B. C. 4004, nor yet midnight, but precisely 0 h. 0 m. 21·6 sec. on the proper day past the point of midnight.

ii. It appears from M. Biot[h] that the sun entered apogee A. D. 1780 on June 30 (N. S.) at 0 h. 20 m. 23·86 sec. past noon, for the meridian of Paris; i. e. June 30 at 12 h. 20 m. 23·86 sec. from midnight: and that the longitude of the apogee, reckoned from the mean vernal equinox (Delambre's equinox,) the mean longitude, at the same point of time, was 99° 8′ 55″·8.

The meridian of Paris, according to the Connaissance des Temps, is 32° 51′ 15″ west of that of Jerusalem: and that is = 2 h. 11 m. 25 sec. in mean solar time[i]. We have then, according to this statement, A. D. 1780,

			h.	m.	s.	
Sun in apogee, meridian of Paris,	June	30	12	20	23·86	mean t.
		+	2	11	25	
Sun in apogee, meridian of Jerusalem,	June	30	14	31	48·86	mean t.

The mean longitude of the apogee at the same epoch, reduced to mean solar time according to the mean motion of our own Tables[k], stands as follows:

°	′	″		d.	h.	m.	s.
90	0	0	=	91	7	27	12·6
9	0	0	=	9	3	8	43·26
	8	0	=		3	14	47·751 999 993 6
		55	=			22	19·221 583 332 6
		·8	=				19·479 586 666 656
99	8	55·8	=	100	14	13	22·313 169 992 856

The number of mean tropical years, from the mean V. E. A. M. 1 B. C. 4004, to the mean S. S. A.M. 5784 A. D. 1780, was 5783·25: and the annual difference of standards, 1·206 653 76 sec., multiplied by this number gives 1 h. 56 m. 18·380 357 52 sec. But as the mean summer solstice this year fell out June 21 (N.S.) at 5 h. 49 m. 17·4 sec. for the meridian of the Tables, and the entrance of the sun into apogee took place 9 days, 8 or 9 hours, later, we must increase this difference by $\frac{1}{40}$ of 1·206 sec. at least, corresponding to $\frac{1}{40}$ of 360 days: i. e. by 0·03 sec. We have then, A. D. 1780,

h Traité Élémentaire, tome iv. 520. § 352.
i Supplementary Tables, Table xxvi. P. i.
k Supplementary Tables, Table viii. P. i. and ii.

		h.	m.	s.
The mean V. E. of the Tables ..	March 8 = 19	22	10	33·6
i. ii. and iii Correction	+ 2	0	11	31·2
Mean V. E. of the Tables thrice corrected	March 21	22	22	4·8
99° 8′ 55″·8 mean motion of the Tables	+ 100	14	13	22·313 2
	June 30	12	35	27·113 2
Difference of standards, 5783·25 yrs. 9 days ..	+	1	56	18·410 3
	June 30	14	31	45·523 5

Consequently we have A. D. 1780 for the meridian of Jerusalem, according to M. Biot,

		h.	m.	s.
Sun in apogee	June 30	14	31	48·86
According to our Tables equated to Delambre's	June 30	14	31	45·523 5
	Difference		−	3·336 5

The observation from which this date was deduced by M. Biot it appears was in reality one of the entrance of the sun into perigee, made by Maskelyne at the end of this year, A. D. 1780[l]; the date of which he determines, after Delambre, to Dec. 29, at 6 h.4402 mean time in the decimal notation, from noon, for the meridian of Paris. The reduction of this date to the sexagesimal notation is as follows[m]:

$$6\text{h.} = \frac{24 \times 6}{10} = 14{\cdot}4 = 14\text{h. } 24\text{m. } 0\text{s.}$$

$$\frac{4402 \times 864\text{s.}}{1000} = 3803\text{s.}{\cdot}328 = 1\text{h. } 3\text{m. } 23{\cdot}328\text{s.}$$

$$6\text{h. } 4402 = 15\text{h. } 27\text{m. } 23{\cdot}328\text{s.}$$

or thus:

6·440 2 h.	× 2·4	=	15·456 48 h.
0·456 48 h.	× 60	=	27·388 8 m.
0·388 8 m.	× 60	=	23·328 s.
6·440 2 h. of the decimal		=	15 h. 27 m. 23·328 s. of the sexagesimal notation.

So that this date of the ingress into perigee A. D. 1780 stood thus:

		h.	m.	s.	
For the meridian of Paris	Dec. 29	15	27	23·328	from mean noon.
	Dec. 30	3	27	23·328	fr. mean midnight
	+	2	11	25	
For the meridian of Jerusalem	Dec. 30	5	38	48·328	

Now the half of the anomalistic year, (i. e. of the interval in

[l] Traité, iv. 520. § 352. [m] Traité, ii. P. 308. § 251.

mean solar time in which the sun moves from apogee to perigee, or *vice versa*,) of the standard of Delambre[n], is 182·629 855 d.; i. e. 182 d. 15 h. 6 m. 59·472 sec. We had then, by the preceding calculation, from our own Tables equated to Delambre's, sun in apogee, A. D. 1780 for the

		h.	m.	s.
Meridian of Jerusalem	June 30	14	31	45·524
½ the anomalistic year of Delambre ..	+ 182	15	6	59·472
Sun in perigee, according to our Tables, equated to Delambre's ..	Dec. 30	5	38	44·996
According to M. Biot	Dec. 30	5	38	48·328
Difference				− 3·332

In these two instances we perceive that the difference between the mean solar time of our Tables, equated to those of Delambre by the several steps of the above process, and that of Delambre's, is reduced to little more than three seconds; though it began with being more than 6. This must satisfy us that the difference itself is something *per accidens*.* The inference however from this case is even more necessary than from the former; viz. that, if the mean equinoctial time of our Tables is that of the meridian of Jerusalem, (as it appears

* With regard to this difference in the present instance, 3 s·332 or 3·336 in the former, in defect in our calculation on Mons. Biot's; as this date of the entrance of the sun into perigee is in fact that from which he deduced the other of the entrance into apogee; it appears to us that we ought to have taken into account the difference of the anomalistic year of Delambre and that of our Fasti, at the entrance into perigee in question, A. D. 1780; which we have not done.

Now Delambre's anomalistic year = 182·629 855 d. × 2, or 365·259 710 d. and the difference between this and 365·242 264 d. his standard of the tropical year, = 0·017 446 d. = 25 m. 7·334 4 sec.: the precession of his anomalistic on his tropical year. That of the anomalistic year of the Fasti on the tropical is 25 m. 3·082 sec. The difference of this and that of Delambre's = 4·252 4 sec. On one quarter of the anomalistic year this = 1·063 1 sec., and on three quarters it = 3·189 3 sec. If this be added to the date just obtained from our Tables equated to Delambre's, it makes it almost the same with Mr. Biot's:

		h.	m.	s.
	Dec. 30	5	38	44·996
	Add			3·189
	Dec. 30	5	38	48·185
Mons. Biot ..	Dec. 30	5	38	48·328
				−0·143

n Traité, iv. P. 520. § 352.

to be,) its ultimate epoch must have been 0 h. 0 m. 21·6 sec. past the point of midnight on the proper day.

iii. The mean annual standard of Delambre being 365·242 263 965 9 days; we deduce from it

The mean diurnal movement in longitude		0°·985 647 159 479 9
	=	0° 59′·138 829 568 794
	=	0° 59′ 8″·329 774 127 64
The mean horary ..	..	2′·464 117 898 699 75
The mean sexagesimal in minutes	..	0′·041 068 631 644 995 833
In seconds	..	0′·000 684 477 194 083 263 88

The observation of the perigee just alluded to, it appears from M. Biot[o], was intended to determine the epoch of what he calls the old Solar Tables. In all determinations of this kind the mean longitude of the perigee or of the apogee is a very important element; because, at the moment when the sun is in apogee or in perigee, its mean place in the ecliptic and its true coincide. The mean sun and the true sun at that moment are in conjunction. And it seems that this observation *did* determine the epoch of the ancient Tables; which was the mean longitude of the sun at mean noon Dec. 31. A.D. 1780. 280° 29′ 38″·2. It does not appear that, as referrible to this epoch, the mean longitude of Delambre's Tables would stand in need of any correction. Mr. Baily informs us[p] that the entire difference between the mean longitude of Bessel and his at mean noon Jan. 1 (N. S.) for the meridian of Greenwich A.D. 1801 was 2″·90: and this is as nearly as possible the amount of the difference which would be accumulated in 20 years (Jan. 1 A.D. 1781 to Jan. 1 A.D. 1801) between the mean motion of Bessel's standard and that of Delambre's.

The standard of Delambre is	..	365·242 263 965 9 days
That of Bessel[p] is	..	365·242 220 013
The difference in one year is	..	0·000 043 952 9

In 20 years this = 1 m. 15·950 611 2 sec: and 1 m. 15·950 611 2 sec. in the mean motion of Delambre = 3″·119:* not much more than 2″·90.

* The mean diurnal movement with the standard of Bessel is	..	59′ 8″·330 22
With Delambre's is ..	..	59 8·329 774 127 64
Difference in one day ..	.. =	0·000 445 872 36

and this multiplied by 365·25 = 0″·162 854 879 49. In 20 years (Jan. 1 A.D. 1781 to Jan. 1 A.D. 1801 m. n. alike) this would = 3″·257 097 589 8. The actual difference we are told was 2″·90. And this is in reality what the preceding difference would nearly amount to in 18 years, A.D. 1783—A.D. 1801: i. e. from about the time when Delambre's first solar Tables appeared.

o Traité, iv. p. 520. § 352. p Tables and Formulæ, p. 270.

In fact, according to Francœur,[q] the annual difference between the mean longitude of Bessel and that of Delambre is + 0″·144 477. In 20 years this too = 2″·889 54: i.e. very near what we have just obtained 3″·119: and still nearer to 2″.90, the true difference, according to Mr. Baily, at mean noon Jan. 1. A.D. 1801.

We shall therefore proceed to compare the mean longitude of our own Tables, equated as before to that of Delambre's, but reduced from its own meridian to that of Greenwich, with the mean longitude of Bessel at this epoch Jan. 1. N. S. mean noon A.D. 1801, for the meridian of Greenwich also.

		h.	m.	s.
i. A. D. 1801 we have the mean V. E. of the Tables	March 9 = 21	0	16	12·0
i. ii. iii Corrections	.. + 2	0	11	31·2
Mean V. E. of the Tables, thrice corrected ..	March 21	0	27	43·2
Difference of standards, 0d·000 013 965 9 × 5804 ..	.. +	1	56	43·418 423 04
	March 23	2	24	26.618 423 04
Difference of meridians ..	−	2	20	47
	March 23	0	3	39·618 423 04
	− 80	12	3	39·618 423 04
	Jan. 1	12		

	°	′	″					
ii. SL =	0	0	0·000 000		March 23	0	3	39·618 423 04
−	79	20	49·566 245	=	− 80	12	3	39·618 423 04
SL =	280	39	10·433 755		Jan. 1	12		

The mean longitude of Jan. 1. at 12 h. corrected for aberration, according to Bessel,[r] was 280° 39′ 13″·17. But as Bessel assumes the constant of aberration at 20″·25, and Delambre at 20″·00, we must add 0″·25′ to the former quantity, in order to compare it with Delambre's at the same time. We have then, according to Bessel,

		°	′	″		h.
iii.	SL =	280	39	13·17	Jan. 1	12
			+	0·25		
	SL =	280	39	13·42	Jan. 1	12
Delambre	SL =	280	39	10·43	Jan. 1	12
Difference			−	2·99		

This difference is 0″·09 greater than that which actually existed Jan. 1. at mean noon A. D. 1801: but this too would disappear if we might assume the difference of meridians (that of Jerusalem and that of Greenwich) at 2 sec. of mean solar time more than 2 h. 20 m. 47 sec.

q Astronomie Pratique, p. 382 note, § 260. r Tables and Formulæ, 270.

d. h. m. s.		° ′ ″
80 12 3 39·618 424 04	=	79 20 49·560 245
− 2		− 0·082 137
80 12 3 37·618 424 04	=	79 20 49·478 108

We have then

	° ′ ″		h. m. s.
SL =	0 0 0·000 000		March 23 0 3 37·618 424 04
−	79 20 49·478 108	=	− 80 12 3 37·618 424 04
SL =	280 39 10·521 892		Jan. 1 12
	+ 2.90		
SL =	280 39 13.421 892		i. e. the same as Bessel's, or nearly so.

This comparison therefore proves very clearly that the more exactly the data of Delambre's Tables can be furnished us from any other quarter; the more exactly also they can be represented by those of our own, when properly corrected. We shall illustrate this fact in the last place by comparing the mean sidereal time of Delambre's Tables, represented in like manner by that of our own equated to his, with the mean sidereal time of Bessel Jan. 1. mean noon for the meridian of Greenwich, A. D. 1801. And in instituting this comparison we will assume that the true difference of meridians between Jerusalem and Greenwich is not much less than 2 h. 20 m. 49 sec. though it may not be more.

We obtain the mean sidereal time of Delambre from the division of his mean motion in longitude by 15.

	m. s.
Mean sidereal time of one day ..	3 56·555 318 257 176
.. .. of one hour ..	9·856 471 594 049
.. .. of one minute	0·164 274 526 567 483 33
.. .. of one second	0·002 737 908 776 124 722 2

We have then, by the last calculation,

		h. m. s.
i. Mean V. E. of the Tables for their own meridian, equated to that of Delambre's	March 23	2 24 26·618 423 04
Meridians	..	− 2 20 49
For the meridian of Greenwich ..	March 23	0 3 37·618 423 04
		− 80 12 3 37·618 423 04
	Jan. 1 12	

	h. m. s.		*Mean Sidereal time.* h. m. s.
ii.	March 23 0 3 37·618 423 04	=	0 0 0·000 000
	− 80 12 3 37·618 423 04	=	− 5 17 23·298 939
	Jan. 1 12	=	18 42 36·701 061

The mean longitude of Jan. 1. at mean noon, A. D. 1801, for the meridian of Greenwich, being 280° 39′ 13″·42; divided by 15 it gives

the mean sidereal time corresponding to it for the same epoch and the same meridian,

	h.	m.	s.
	18	42	36·894 666
Delambre	18	42	36·701 061
Difference =			−0·193 605

This difference multiplied by 15 = 2″·904 075; only 0″·004 075 greater than that which actually existed between the mean longitude of Bessel and that of Delambre for the same meridian and at the same time, A. D. 1801. The difference of meridians then (Jerusalem and Greenwich) cannot exceed two seconds more than that which is commonly assumed; and yet it cannot be much less.

The fact therefore being clearly established by such proofs of it as these that the mean equinoctial time, the mean longitude, and the mean sidereal time of Delambre's Tables may be obtained from those of our own, by merely making the corrections of the latter which have been pointed out; it follows that the epoch of Delambre's Tables, carried far enough back, must be the same as that of our own, the primary mean vernal ingress in connection with the present system of things, April 25 B. C. 4004: only for the meridian of Jerusalem in the first instance, not for that of Paris. This we say is a necessary inference, without any further proof, from the fact which has just been demonstrated. And yet it may be further confirmed as follows.

The standard of the mean Julian year being 365 d·25, the difference between that and Delambre's standard of the mean tropical year is 0·007 736 034 1 day. Let us call this the Precession of the mean Julian year on the mean tropical year of Delambre. In N years this precession will accumulate to 0d·007 736 034 1 × N. And if we assume N = interval from the mean V.E. B. C. 4004 to the mean V.E. A.D. 1801, i. e. 5804 mean tropical years, it will amount to

44d·899 941 916 4

i. e. 44d·21h. 35m. 54·981 576 96 sec.

It follows that, having the mean vernal equinox A.D. 1801 given for any meridian, (for instance, that of Jerusalem,) according to Delambre; we ought to recover the mean vernal equinox B.C. 4004 for the same meridian, according to Delambre also, by merely adding to it 5804 years' precession, obtained as above. We have then, supra, p. 513.

		h.	m.	s.
Mean V.E. of the Tables, A.D. 1801, equated to Delambre's	March 23 = 11	2	24	26·618 423 04
Precession, 5804 years +	44	21	35	54·981 576 96
Mean V. E. B. C. 4004 according to Delambre	April 25	0	0	21·6

That is, exactly the same as the epoch of our Tables themselves. This must be decisive that the mean vernal equinox B.C. 4004 for the meridian of Jerusalem even according to the Tables of Delambre must actually have borne date April 25 0h. 0m. 21·6sec. as much as according to our own. And yet this too may be further confirmed, if necessary, by means of the formulæ of Bessel.

The formula, prescribed by Bessel, for finding the mean longitude of any epoch before or after A. D. 1801, from the known mean longitude of any particular day in that year, is as follows[s]:

$$\mp 27''\cdot 605\,844 \times N$$
$$+ 0''\cdot 000\,122\,180\,5 \times N^2;$$

in which N is the number of years before or after A. D. 1801; and the term which contains N is to be subtracted from the mean longitude of the epoch, in going back from A. D. 1801, and is to be added to it in going forwards from it: the term which contains N^2, whether before or after A. D. 1801, is to be added to that which contains N. And this, in the case of a date anterior to A. D. 1801, is the same thing as taking the difference of the two and subtracting it from the longitude of the epoch, A. D. 1801.

Let the given epoch then be April 24 Old Style = May 6 New Style, mean noon, for the meridian of Greenwich, A. D. 1801. We must first find the mean longitude of the sun on that day and at that time for this meridian, according to Bessel.

The mean diurnal movement in longitude with the standard of Bessel is 0° 59′ 8″·330 22: and as the mean longitude of January 1 (N. S.) mean noon, for the meridian of Greenwich, A. D. 1801, according to Bessel, is very exactly known, all we have to do is to reckon on 125 days' mean motion of this standard, from this given mean longitude of January 1 mean noon; and we shall get that of May 6 = April 24 at mean noon, for the same meridian, with equal exactness.

Now		59′ × 125	=	122° 55′ 0″
		8″·330 22 × 125	=	17 21·277 6
		59° 8′·330″ 22 × 125	=	123 12 21·277 6
S L	=	280° 39′ 13″·17		Jan. 1 12h
	+	123 12 21·277 6		+ 125
S L	=	43 51 34·447 6		May 6 = April 24 at 12 h.

[s] Cf. Francœur, Astronomie Pratique, 381. § 260, who refers to the Connaissance des Temps, 1831.

In the next place we assume N in the formula = 5804, and N^2 = 33 686 416. We have then

$$-\ 27''{\cdot}605\,844 \times N \quad = -160\,224''{\cdot}318\,576$$
$$+\ 0''{\cdot}000\,122\,180\,5 \times N^2 = +\quad 4\,115\ {\cdot}823\,150\,088$$
$$-156\,108\ {\cdot}495\,425\,912$$
$$= -43\ 21'\ 48''{\cdot}495\,425\,912$$

Hence,

S L =	43° 51′ 34″·447 6	April 24 12h	A. D. 1801
	− 43 21 48·495 425 912		− 5804
S L =	0 29 45·952 174 088	April 24 12	B. C. 4004

And this being reduced to the mean motion of our own Tables stands as follows [t]:

		h. m. s.
29′ 0″	=	11 46 8·101 02
45	=	18 15·726 75
·9	=	21·914 535
·05	=	1·217 474
·002	=	0·048 699
·000 2	=	0·004 870
29 45·952 2	=	12 4 47·013 348

We have therefore from formula and for the meridian of Greenwich,

			h. m. s.	B. C.
S L =	0° 29′ 45″·952 2	April 24	12 0 0	4004
	− 29 45·952 2		− 12 4 47·013 348	
S L =	0 0 0·0	April 23	23 55 12·986 652	

That is, we have the mean vernal equinox for the same meridian, B. C. 4004, April 23 at 23h. 55m. 12 sec. 986 652 from midnight. For the meridian of Jerusalem, we have supposed it

		h. m. s.	
	April 25	0 0 21·6	B. C. 4004
Subtract	..	2 20 49	
Meridian of Greenwich	April 24	21 39 32·6	

The result obtained from formula differs from this, first in the date of the day, April 23, instead of April 24; secondly, in the time of the day, 23h. 55m. 12·987 sec. instead of 21 h. 39m. 32·6 sec. The former difference is merely nominal; April 24 being the same thing in going back from the present day to B. C. 4004, as April 25 in coming down from B. C. 4004 to the present day; and therefore

[t] Supplementary Tables, Table viii. Part i. ii.

April 23 as April 24. But the other difference will remain to be accounted for; and it amounts to 2h. 15m. 40·387 sec. in terms of one and the same noctidiurnal cycle; by which this primary equinox as obtained from formula is later than the true primary one for the same meridian. And if this difference is not to be explained by some possible inadequacy of the formula for so remote an epoch as B. C. 4004; we do not see to what it can be ultimately traced up, but the longitude of the epoch, April 24 at mean noon, for the same meridian, A. D. 1801. This however is a question which we submit to the astronomers. We will observe ourselves only that, if we may be permitted to reckon back from the mean longitude of April 24 at mean noon for the meridian of Greenwich A. D. 1801, exactly as it is shewn by our Tables without being corrected in order to equate them to Delambre's; then we can recover the true mean vernal ingress for the same meridian B. C. 4004, even from the formula of Bessel, with as much exactness as can possibly be expected.

According to our Tables[t], we have

S L =	43° 56′ 20″·169	April 24 12	A. D. 1801 at Greenwich
Correction −	43 21 48·495		− 5804
S L =	0 34 31·674	April 24 12	B. C. 4004 at Greenwich

The reduction of this[v] stands as follows:

′ ″		h. m. s.
34 0	=	13 47 52·920
31	=	12 34·834
·6	=	14·610
·07	=	1·704
·004	=	0·097
34′ 31″·674	=	14 0 44·165

We have then,

	° ′ ″		h. m. s.	
S L =	0 34 31·674	April 24	12 0 0	B. C. 4004
−	0 34 31·674	−	14 0 44·2	
S L =	0 0 0.0	April 23	21 59 15·8	B. C. 4004
True mean V. E. for the same meridian,		April 24 =	23 21 39 32·6	
Excess by formula,			19 43·2	

It appears then that the sun's mean longitude A. M. 1 B. C. 4004, for the meridian of Greenwich, was 0°·0′·0″ at 2h. 20m. 27·4 sec. before the point of midnight; and for that of Jerusalem, at

[t] Introduction to the Tables, 219. Part iii. ch. i. sect. vii. The difference of 2 seconds in the meridians is not here taken into account.

[v] Supplementary Tables, Table viii. Part i. ii.

0h. 0m. 21·6 sec. past the point of midnight, on one and the same day. The mere statement of this fact is sufficient to prove that as referred to the point of midnight, in conformity to one and the same positive rule of the reckoning of annual and noctidiurnal time in conjunction from this primary ingress, the meridian of Jerusalem was primary in comparison of that of Greenwich, and the meridian of Greenwich was secondary in comparison of that of Jerusalem. As to the day itself, the point of midnight on which makes the distinction between these two meridians, it is the same, whether we style it April 24 or April 25. It is April 25 in coming down with this whole succession of ingresses, beginning with the primary one of all: it is April 24 in going back with them and ending with that. The calculation which we proposed above[x] made it April 25; this present one has made it April 24. If one of these is not to be inconsistent with the other, April 24 must be only another name for April 25, and April 25 for April 24[y].

It appears to us then that the necessity of those three corrections of Division B of our Fasti, which we began with stating, has been established. It is a corollary however from our conclusions, (and a very important one,) that the primary epoch even of the most exact and the most approved of the modern solar Tables, when these are traced back to their origin, is absolutely identical with that of our own. There is no difference between those Tables and ours, but the difference of standards and difference of meridians. The mean longitude, the mean equinoctial time, the mean sidereal time of Delambre's Tables have had the same origin as those of our own, the mean vernal equinox A. M. 1, B. C. 4004; only for a different meridian.

It is therefore for chronologers to consider, whether the year, thus designated as the actual epoch of every species and form of mean time or of angular motion which enters the modern Tables, is not the true A. M. 1; the absolute beginning of every thing of that description and of that denomination which is proper to our own world. And it is for the astronomers to consider whether that meridian, of which the actual beginning and decursus of all these things in common, subject to a positive rule, (the same for one meridian as for another,) first and most properly held good, the meridian of the ancient Jerusalem, is not the true Primary Meridian, appointed and

x P. 515.

y See our Fasti, i. p. 452, Diss. vi. ch. iv. sect. i.: p. 483, Diss. vi. ch. iv. sect. vii: p. 490, sect. ix. Introduction to the Tables, 137, 138, Part ii. ch. iii. sect. vii: 217, 218. Part iii. ch. i. sect. vii: 247–251. sect. xvi: 263. sect. xix.

designated by Nature itself in that capacity, to stand at the head of all and to take the lead of all. In particular it seems to be only proper for the astronomers to consider, if the mean motion of our Tables and that of Delambre's must in reality have had a common epoch and a common origin, and are only accidentally different even at present; whether one of these is not to be corrected by the other? and in that case which of the two is to serve as the standard of reference for the other? which of the two is to be regarded as the true mean standard of nature itself? For that one or the other of them under the circumstances of the case may lay claim even to that character seems to follow from what has been pointed out of each.

On such questions as these, we think it better on every account to offer no opinion of our own. We will observe only that, as the mean motion of our Tables is somewhat more accelerated than that of Delambre's, even though both had set out together at a given time and for a given meridian, the phenomenon which we have pointed out would be a necessary consequence of the difference in question. The mean equinoxes of our Tables would anticipate on those of Delambre every year in proportion to the difference in the rate of the mean motion, i. e. of the standards, of each; and that difference in 5804 years would be just what it appears to have been, A. D. 1801, and yet be after all an accidental difference: a difference which would not have appeared even A. D. 1801 had Delambre's standard been assumed in exact conformity to our own.

Mean motions are calculated and laid down in the Tables of the astronomers, in order that mean places may be found thereby; and from these mean places true ones. But to render the mean available for that purpose, certain corrections must be applied to them; which in the case of the sun or the moon are called the Equation of the Centre: for in the case of either of those bodies the equation of the centre is defined to be the reduction of its mean place, at a given time, to its true. This equation depends on the mean anomaly; which is defined by the astronomers in like manner to be the difference of the mean place at a given time and the true. The true places are determined as much as possible by observation; but the mean must depend more or less after all on hypothesis and assumption: and if so the mean anomaly and the equation of the centre also. And yet, if each of these things is critically accommodated to the others, we submit it to the astronomers whether an error of excess or of defect in the assumed standard of the mean motion would not be compensated by a corresponding error in the equation of

the centre? It cannot be denied that the modern solar Tables, without any correction, are admirably adapted for their proper use and application, the determination of true places from mean. But every thing in these Tables hangs together. One element is critically adapted to another, and one is exactly in proportion to another. We submit it therefore to the judgment of more competent persons, whether all this might not be the case with the practical use and efficiency of the modern Tables, and yet some error be involved at bottom in the assumption of that, which must be more or less arbitrary after all, the standard of the mean motion in longitude.

Mean motions cannot be made the objects of sensible apprehension. The method which astronomers employ to discover and determine them is consequently the comparison of numerous observations. Delambre deduced his standard from the discussion of upwards of 1200. Yet even this mode of proceeding must end in an assumption at last; and in an assumption which must differ more or less from the truth. It cannot be pretended that the most exact determination so made, and on the broadest basis of induction which has yet been used for that purpose, is more than an approximation, after all. The astronomy of the beginning of things, as far as we have been able to discover, did not rest upon observation, but upon authority and prescription: and yet, as far as we have been able to discover also, the mean standards of the earliest astronomy appear to have been absolutely those of nature itself. In this respect the astronomy of the beginning set out from the very point at which that of our own day, perfect as it appears and as indeed it is in many other respects, has not yet made an end; for even on the admission of the astronomers themselves, the true mean standards of the solar and the lunar momenta are still subjects of doubt and investigation; and cannot even yet be considered to have been settled.

On this particular question then of the true mean standard of the natural year we will be content to cite the opinion of La Place. After observing, as we did[z], that the standard which supplies the correction of the Gregorian one is this of $365\frac{969}{4000}$ or 365·242 25, he concludes[a]: "Ce qui approche tellement de la longueur 365 j. 2422419 déterminée par les observations, que l'on peut négliger la différence, vu la petite incertitude que les observations elles-mêmes laissent sur la vraie longueur de l'année, qui d'ailleurs n'est pas rigoureusement constante." For this virtually amounts to an admis-

[z] Fasti ii. 31. Diss. ix. ch. i. sect. viii.

[a] Systême du Monde, i. liv. i. chap. iii. p. 33. Paris, 1824.

sion that, for any thing which observation has yet determined to the contrary, this particular standard may be the true mean standard of Nature itself.

The fact at least, which we appear to have established, viz. that an accurate comparison of the mean equinoctial and the mean sidereal time of our Tables with those of the modern Tables has detected an error of one or two seconds in the assumed difference of the meridians of Jerusalem and Greenwich, or Jerusalem and Paris, respectively, will not be lost upon the astronomers. It ought not at least to be so, without further inquiry and examination. They have long been seeking for some means of fixing the difference of the mean longitude and mean time (both solar and sidereal) of their respective observatories: and possibly our Tables may furnish them with those means. For if they are competent to detect an error of this kind in one instance, they must be competent to do the same thing in another; and they will do it for the same reason in every instance: viz. because they are themselves perpetually an exact measure of the true mean longitude, and the true mean solar time, and the true mean sidereal time, of one meridian, that of the ancient Jerusalem. As to the error in the particular instances which we have been considering; it seems to have resided ultimately in the assumed difference of the meridian of Jerusalem compared with that of Paris, not in that of Paris compared with that of Greenwich. And after all the pains which the astronomers of both nations have been at to fix this one point, the difference between the meridians of Paris and Greenwich, it may well be supposed to have been very exactly ascertained. But who could consider it improbable *a priori* that the difference between the meridian of Paris and that of Jerusalem has never yet been absolutely fixed; or that the most exact determination of that kind ever made might not be one second and an half of mean time in defect of the truth? Even the Problem of the Longitude, which ranks as yet among the number of impossible problems, must be solved at last (if at all) by means of such data as our inquiries have been permitted to bring to light; or at least not without them: i. e. the epoch of origination of the mean longitude, the mean solar and equinoctial time, and the mean sidereal time, of the present system of things, and the meridian to which they were all first and properly adapted.

The most remarkable circumstance however, and the least to have been divined or conjectured *a priori*, is the fact, which we have also discovered, that each of these things took its rise, at the proper time and for the proper meridian, not at the point of midnight, but

oh. om. 21·6 sec. of mean time exactly past the point of midnight. This quantity of mean solar time, 21·6 sec. minute and inconsiderable as it seems, is a very important and a very influential element in the whole of that complicated system of things which constitutes the proper time of our proper world ; perhaps the most important and the most influential of all. The entire system is made up of this. It is the monad or atom of the whole. It measures the annual difference of the mean natural year and the mean Julian perpetually. It measures the epact of the mean natural year, and the mean natural year itself. It measures the epact of the mean Julian year, and the mean Julian year also. It measures the equable year. It measures the Diurnal rotation. It measures the Noctidiurnal Cycle. It measures the Cycle of Meridians, 4000 in number, which Nature appears to have established[b]; and it makes the difference between them perpetually. It is the link of connection between the mean noctidiurnal time of the existing system of things, and the mean annual in the sense of natural, and the mean annual in the sense of Julian. That these latter are not commensurable one with the other in terms of the noctidiurnal cycle, for a time, and that they are so after a time or at last, is owing to this same element. If 129 natural years of our standard *plus* one cycle of 24 hours, or one day and night, are not equal to 129 mean Julian years ; or four times 129 *plus* four cycles of day and night are not equal to 516 mean Julian years perpetually ; it is due to this small quantity : and yet that 4000 times 129 natural years *plus* 3999 cycles of day and night are exactly equal to 516 000 mean Julian years, 129 000 cycles of the Julian leap-year, is due to it also. In short, it is a truly significant circumstance that the proper mean time of our proper system should be found attached to this particular epoch of oh. om. 21·6 sec. past the point of midnight, and not to the point of midnight exactly. It does more to connect the proper mean time of our own system with something of the same kind older than itself, than any thing which we have yet discovered. To this subject however we may perhaps have occasion to return in the next chapter.

CHAPTER II.

On the correction of the Julian dates of the mean equinoxes of the Tables from a certain time downwards.

We shall now proceed to explain the reason of the third of the above corrections ; the addition of two terms in the regular order of

[b] Introduction to the Tables, 233, Part iii. ch. i. sect. xiv.

the Julian notation to the Julian dates of the mean equinoxes of our Tables at present.

On reviewing the account which we have given of the two miracles of Scripture[c], as they affected the different measures of time in general; we have seen nothing to retract or to qualify in that part of it which relates to the effect produced on the reckoning of the noctidiurnal and of the hebdomadal cycle in particular, before and after each respectively. The consideration of the question in what manner they might have affected the reckoning of mean or actual lunar time, before and after, hitherto has been reserved; and we hope to enter upon it by and by. But with regard to their proper and special effect on the mean natural annual cycle and on the mean Julian annual cycle, and on the relation of one of these to the other, before and after the times of these two miracles respectively; we have seen reason to conclude that we laboured under a misapprehension of the truth; and therefore that we have not represented this particular effect correctly. Whether this misapprehension at the time and under the circumstances of the case was an excusable one or not, we leave to the judgment of others. It is our own duty at present to admit the fact of it; and to the best of our ability to correct it. And we are thankful that it is still in our power to do this before it is too late; and that the correction itself is so easily to be made that it can detract little or nothing from the convenience, much less the utility and the efficiency, of our Tables.

Of the various forms of time which may be regarded as most proper to the present system of things and the most distinctive of it, the noctidiurnal, the hebdomadal, the natural annual, the equable annual, the Julian annual, the sidereal annual, the anomalistic annual; there is not one which, being traced back to its origin, is not found to have taken its rise at the same epoch as the rest[d]: and that epoch the point of the mean vernal equinox for the proper meridian, B. C. 4004. And forasmuch as there is no such epoch, either past or present or future, which is not capable of being expressed at a given time in terms of the Julian calendar; it follows that there must have been a Julian date of origination of every species of time, (connected *de facto* from the first with the present system of things,) a date of that kind common to all of them, but first and properly that of the mean vernal equinox for the meridian in question, and at the time in question.

[c] Vol. i. 302–321. Diss. v. ch. iii. section x.–xvi: 242. ch. i. section iii. vii: 148. ch. iv. sect. i: 157. sect. iii: 177. ch. v. sect. v: 202. Part iii. ch. i.

[d] Cf. the Introduction to the Tables, 130. Part ii. ch. iii. sect. vi: 137. sect. sect. v: 207–214. sect. vii: 239–251. sect. xvi.

The mean equinoctial, the equable annual, the mean annual sidereal, and the mean annual anomalistic time either of the present or of any system of things might take their rise in conjunction and simultaneously on a given Julian date; and consequently have ever after a common Julian epoch of origination. But, from their particular nature itself as measures of time *sui generis*, none of these could continue attached to the same Julian term, even that of origination, perpetually. None of them could set out from any one such Julian term at first, and after the interval of duration which we understand to be meant by its proper year, return to it again perpetually. But mean noctidiurnal, mean hebdomadal, and mean Julian annual time would be capable of doing this. They are all alike successions of day and night, or of the period of 24 hours of mean solar time; and nothing more [e]. The mere succession of day and night or of this period, once subjected to a certain law, might go on subject to it perpetually. A given Julian epoch must continue the same with itself, at least in terms: and if the noctidiurnal, the hebdomadal, and the annual in the sense of the Julian, time of the present system of things really took its rise on April 25, at midnight, for a given meridian; its proper Julian epoch must be April 25 at midnight for the same meridian ever after. The duration of such a system, in terms of that complex of noctidiurnal and hebdomadal time in conjunction, which we call the Julian year, must be measured or measurable by the interval between April 25 at midnight in one such complex, for the given meridian, and April 25 at midnight in the next, for the same meridian perpetually.

Now as time and motion are convertible terms, and either of them is commensurable with the other, and either of them is capable of being reduced to and expressed by the other; if there is a proper Julian epoch of the mean solar time of the present system, there must be a proper Julian epoch of the mean solar motion in longitude proper to it also: and if the former was April 25 at midnight for a certain meridian in a certain year, the latter must have been so too. If so, there can be no impropriety in calling the mean longitude of this particular Julian term, April 25 at midnight, for this meridian, the proper Julian longitude of the existing system of things. The mean longitude of this Julian term at midnight for this meridian must be the proper measure of the duration of this system, in terms of the mean solar motion in longitude. And yet it is manifest, under such circumstances as we are supposing, that if both the mean equinoctial

e Fasti i. 89. Diss. iii. ch. i. sect. vi: 496. Diss. vi. ch. iv. section xii. Introduction to the Tables, 126. sqq. Part ii. ch. iii. sect. iv. sqq.

and the mean Julian time of the system took their rise at once, at the point of midnight and at the point of the mean vernal equinox, for one and the same meridian; the epoch of the Julian longitude of the system and the epoch of the mean longitude *absolutely*, (which must always be the point of the mean vernal equinox,) at first could have been nothing different.

The difference of the mean natural year and the mean Julian, in mean solar time, is 11 m. 9·6 sec. In mean angular motion it is 27″·499 556 800 953 54[f]. Consequently the annual difference between the mean motion in longitude in the proper natural year and in the proper Julian year of such a system of things as the present is this quantity also. If this motion then began to proceed in both simultaneously, at the point of midnight April 25, in a given year, for a given meridian, and at the point of the mean vernal equinox also; the proper measure of the duration of the system in terms of annual Julian time, (including noctidiurnal and hebdomadal,) and in terms of the mean solar motion in longitude, ever after must be the mean longitude of this Julian term April 25 at midnight for the same meridian as at first, at the beginning of every fresh Julian year—yet reckoned from the epoch of mean longitude absolutely, the point of the mean vernal equinox perpetually. And this mean longitude, the proper measure of the duration of the system, in terms of its annual Julian time and in terms of the mean solar motion perpetually, which by hypothesis began with being 0° 0′ 0″ April 25th at midnight, for the proper meridian, referred to the epoch of mean longitude absolutely, at the beginning of the first such Julian year; at the beginning of the next would be 27″·499 556 800 953 54, April 25th at midnight referred to the same epoch, and for the same meridian; and at the beginning of the third year, on the same day at midnight, and for the same meridian, it would be 54″·999 113 601 907 08, similarly referred and reckoned; and so on: increasing every mean Julian year by this quantity 27″·499 556 800 953 54, which measures the difference between the mean natural year and the mean Julian year in angular motion in the sense of the mean solar motion in longitude[g]; yet still as reckoned from the epoch of mean longitude absolutely, the point of the mean vernal equinox perpetually. And while both the mean natural year and the mean Julian year continued to be such in themselves, and relatively to each other, as they came into existence at first; and while the mean motion in longitude continued the same also, and

[f] Supplementary Tables, Table vii. P. iii, iv: Table x.

[g] Cf. the Introduction to the Tables, 212. Part. iii. ch. i. section vii.

went on in each of these years in proportion alike; it is impossible to conceive that the stated annual increment of the proper mean Julian longitude of the system, (the proper measure of its duration in terms of the mean solar motion in longitude and in terms of the mean Julian year at once,) could ever be more or less than the mean longitude of April 25 at midnight for the same meridian as at first, augmented by this annual difference perpetually. But this brings us to the question of the disturbance of these relations by the two miracles of Scripture; and to that of the manner in which this ought to have been taken into account.

Now could such an extraordinary event as the solstice of Joshua be supposed to happen in our own time, when both natural annual time and civil annual in the sense of Julian are going on in conjunction, including noctidiurnal and hebdomadal also; and when one is as much an actual measure of all these successions, noctidiurnal, hebdomadal, and annual at once, as the other; we apprehend that no account of the specific effect of such an anomaly on the relations of these two kinds of annual time to each other respectively could be given, different from that which we ourselves gave when we were endeavouring to explain that effect on the former occasion[h]. Could we suppose 12 hours of mean solar time to be added all at once to the length of the mean Julian year at present, yet no corresponding addition to be made to that of the mean natural; we apprehend that the stated difference of these two years, under such circumstances, must necessarily be found to rise *per saltum* from 11 m. 9·6 sec. to 12 h. 11 m. 9·6 sec. And therefore the stated increment in the mean Julian longitude of such a system as the present from the first, the mean longitude of a given Julian term like April 25, at midnight, for a given meridian, must be found to rise *per saltum* also to the same amount.

Now this is in reality the explanation of the effect which we proposed[h]; and it must be evident that, if we represented it amiss, the ultimate cause of the mistake into which we fell was our regarding and treating the relations of the natural year to the Julian of the time being as if they had been identical with those of the natural year to the Julian at present: in other words, our regarding and treating the Julian Type of our Fasti for the time being as the same thing in its relations to the natural year as the actual Julian year at present. But no proleptic, hypothetical, and merely conventional and temporary form of the Julian year, though supplying the place of the actual in its relation to the natural, for the time being, can

[h] i. 308 sqq. Diss. v. ch. iii. sect. xiii. sqq. cf. 242 sq. ch. i. sect. iii.

ever be regarded and treated as the actual Julian year before its time. And before the actual Julian year was yet in existence, we have satisfied ourselves that the method adopted by Nature itself, in order to equalise the noctidiurnal succession even in an existing annual one, which was Julian in principle though not the same with the actual Julian, to the noctidiurnal succession in the natural annual perpetually, was that of setting back the epoch of this succession in the former 24 hours of mean time, or one day and night exactly, behind its epoch in the latter, with every change of the Julian Types of the natural annual succession itself; after the manner which we have illustrated and verified by particular proofs of the fact[i].

We now clearly perceive that *this* is the principle on which the effect of the two miracles upon the relation of the mean annual natural time of our Tables to the mean annual Julian, and upon that of the epoch of mean Julian longitude to the epoch of mean longitude, and *vice versa*, is to be explained. Not that the mean annual natural time of our Tables, on two several occasions, fell back 12 hours *extra ordinem* on the mean annual Julian; but that the epoch of the mean annual Julian time of our Tables, from first to last, on two several occasions fell back 12 hours on itself. Not that the mean Julian longitude of the present system has twice exhibited the phenomenon of a rise *per saltum* of 12 hours' mean motion greater than usual, in one year, as referred to the epoch of mean longitude; but that the epoch of this mean Julian longitude itself, which at first was the same with that of mean longitude also, on two several occasions has been depressed and set back, in comparison of that, 12 hours' mean motion; once in consequence of the first miracle, and again in consequence of the second: so that by virtue of both at last, and as the joint and the permanent effect of both, whereas it was at first and for a long time after nothing distinct from the epoch of mean longitude absolutely, it is at present and it long has been a totally different thing from that. There is at present and long has been a difference between them of 24 hours' mean time and mean motion. The true mean Julian longitude of the existing system and order of things, even for the same meridian as at first, is not now to be reckoned from the point of the mean vernal equinox, but from a point which is 24 hours' mean motion behind it. It follows that the proper Julian term, to which this mean longitude has always been attached from the first, has dropped too, from what it was at first, to the next below it; from April 25 at midnight, for the proper meridian, to April 24 at midnight, for the same meridian. It follows

[i] i. 521 sqq: Diss. vi. ch. v. section ix.

too that, notwithstanding this, the proper duration of the existing system of things, in terms of its proper mean Julian time and of its proper mean solar motion in longitude, is as truly represented by the mean longitude of April 24 at midnight for the proper meridian at present, as it was by that of April 25 at midnight for the same at first.

We shall illustrate and at the same time confirm this distinction by the proof of four propositions; each of which we will first state and then proceed to verify in order. First, that the epoch of mean Julian longitude, understood in the sense in which we have defined it, from the mean vernal equinox B. C. 4004 down to the mean vernal equinox B. C. 1520, and down to April 25, within 36 days of May 31, that year, the date of the first miracle, was still the same as the epoch of mean longitude. This proposition will be established if it can be made to appear that the mean longitude of April 25 at midnight B.C. 1520 for a given meridian was just the same, reckoned whether from that of April 25 at midnight B. C. 4004 in the mean Julian year of our Tables perpetually, or from the mean vernal equinox B. C. 1520.

i. Calculation of the mean longitude (SL) of April 25 at midnight, for the meridian of Jerusalem, B. C. 1520, from the mean vernal equinox of that year.

			h.	m.	s.	
Tabular mean V. E.	April	5	17	47	24·0	B. C. 1520.
Correction ..			+	11	9·6	
True mean V. E.	April	5	17	58	33·6	
	+	19	6	1	26·4	
	April	25	0	0	0·0	

		°	′	″			h.	m.	s.
SL	=	0	0	0·000 000	April	5	17	58	33·6
Table vii. Part i–iv.	+	18	58	28·899 106	+	19	6	1	26·4
SL	=	18	58	28·899 106	April	25	0	0	0·0

ii. Calculation of the mean longitude (SL′) of April 25 at midnight for the meridian of Jerusalem, B. C. 1520, from the mean longitude of April 25 at midnight for the same meridian B. C. 4004. Second year of the cycle of leap-year. Interval in mean Julian years 2484 years.

		°	″	′		m.	h.	s.	
SL′	=	0	0	0 000 000	April 25	0	0	0	B. C. 4004
Table xii.	+	18	58	28·899 093					— 2484
SL′	=	18	58	28·899 093	April 25	0	0	0	B. C. 1520
SL	=	18	58	28·899 106					
				— 0·000 013					

There could then have been no change in the epoch of Julian longitude, and in its relation to the epoch of mean longitude, from the mean V. E. B. C. 4004 to the mean V. E. B. C. 1520 at least. Our next proposition is that, only *one* year later than the date of the first miracle, the epoch of Julian longitude was already 12 hours in anticipation of that of mean longitude. And this also will be made to appear, if it can be shewn that the mean longitude of April 24 at 12 hours from midnight for a given meridian B. C. 1519 was just the same, reckoned whether from the mean V. E. B. C. 1519, or from the mean longitude of April 24 at 12 hours, for the given meridian, B. C. 4004, in the mean Julian year.

i. Calculation of S L April 24 at 12 h. for the meridian of Jerusalem B. C. 1519, from the mean vernal equinox of that year.

			h.	m.	s.	
Tabular mean V. E.	April	5	11	36	14·4	B. C. 1519
Correction		+	12	11	9·6	
True mean V. E.	April	5	23	47	24·0	
	+	18	12	12	36	
	April	24	12	0	0	

		°	′	″			h.	m.	s.
SL	=	0	0	0·000 000	April	5	23	47	24·0
Table vii. Part i–iv.	+	18	14	35·151 237	+	18	12	12	36
SL	=	18	14	35·151 237	April	24	12	0	0

ii. Calculation of S L′ April 24 at 12 h. B. C. 1519 for the meridian of Jerusalem, from the mean longitude of April 24 at 12 h. for the same meridian B. C. 4003. Third year of the cycle of leap-year. Interval, 2484 mean Julian years.

		°	′	″		h.	m.	s.	
SL′	=	359	45	40·417 079	April 25	0	0	0	B. C. 4003
Table vii. P. ii.	—		29	34·164 955		— 12			
		359	16	6·252 124	April 24	12			B. C. 4003
Table x.	+	18	58	28·899 093					— 2484
SL′	=	18	14	35·151 217	April 24	12			B. C. 1519
SL	=	18	14	35·151 237					
			—	0·000 020					

It follows that between April 25 at midnight B. C. 1520, and April 25 at midnight B. C. 1519, the epoch of mean Julian longitude, referred to its proper zero or 0 B. C. 4004, must have been depressed 12 hours; i. e. from April 25 at midnight, to April 24 at 12 hours from midnight. If so, by virtue of the first miracle; which came between these extremes. Now if the epoch had fallen back 12 hours on April 25 at midnight B. C. 4004, its own zero or 0, it had fallen

back 12 hours on the epoch of mean longitude also; the true zero of which from the first was April 25 at midnight too. But this epoch had not fallen back on itself, nominally and in terms at least: nor consequently had varied in its relation, nominally and in terms at least, to any thing else. The absolute interval in mean longitude between April 25 at midnight and the mean vernal equinox B. C. 1519 was equal at this very time to the absolute interval in mean longitude between the epoch of Julian longitude, 12 hours below the point of the mean vernal equinox, and April 24 at 12 hours, 12 hours below the point of midnight April 25.

Our third proposition is that down to April 24 B. C. 710, within 37 days as before of the date of the second miracle, the epoch of mean Julian longitude was still 12 hours and no more behind the epoch of mean longitude; i. e. was still in the state in which it had been left by the first miracle. And the proof of this proposition is the same as that of the last.

i. Calculation of SL April 24 at 12 h. B. C. 710 for the meridian of Jerusalem, from the mean V. E. of that year.

		h.	m.	s.	
Tabular mean V. E.	March 30	11	7	48·0	B. C. 710
Correction	..	+ 12	11	9·6	
True mean V. E.	March 30	23	18	57·6	
	+ 24	12	41	2·4	
	April 24	12	0	0·0	

		°	′	″			h.	m.	s.
SL	=	0	0	0·000 000	March	30	23	18	57·6
Tab. vii. Pt. i–iv.	+	24	10	35·210 215	+	24	12	41	2·4
SL	=	24	10	35·210 215	April	24	12	0	0·0

ii. Calculation of the mean longitude (SL′) of April 24 at 12 h. for the meridian of Jerusalem, B. C. 710, from the mean longitude of April 24 at 12 h. for the same meridian, B. C. 4002, in the mean Julian year. Fourth year of the cycle of leap-year. Interval, 3292 mean Julian years.

		°	′	″			h.	m.	s.	
SL′	=	359	31	20·834 159	April	25	0	0	0	B. C. 4002
Table vii. Part ii.	—		29	34·164 955		—	12			
SL′	=	359	1	46·669 204	April	24	12			B. C. 4002
Table x.	+	25	8	48·540 989						— 3292
SL′	=	24	10	35·210 193	April	24	12			B. C. 710
SL	=	24	10	35·210 215						
				— 0·000 022						

Our fourth proposition is that B. C. 709, one year after the date of the second miracle, the epoch of mean Julian longitude was then 24 hours behind that of mean longitude. And this also will be established

by making it appear that the mean longitude of April 24 at midnight for a given meridian B. C. 709 was just the same, reckoned whether from the mean vernal equinox in the natural year, or from B. C. 4004 in the mean Julian year.

i. Calculation of SL, the mean longitude of April 24 at midnight B. C. 709 for the meridian of Jerusalem, from the mean vernal equinox of that year.

		h.	m.	s.	
Tabular mean V. E.	March 29	4	56	38·4	B. C. 709
Correction	+ 1	0	11	9·6	
True mean V. E.	March 30	5	7	48·0	
	+ 24	18	52	12	
	April 24	0	0	0	

		°	′	″		h.	m.	s.
SL	=	0	0	0·000 000	March 30	5	7	48.0
Tab. vii. Pt. i–iv.	+	24	25	49·792 255	+ 24	18	52	12
SL′	=	24	25	49·792 255	April 24	0	0	0

ii. Calculation of SL′, April 24 at midnight for the meridian of Jerusalem B. C. 709, from the mean longitude of April 24 at midnight for the same meridian B. C. 4001, in the mean Julian year. First year of the cycle of leap-year. Interval, 3292 mean Julian years.

		°	′	″		h.	m.	s.	
SL′	=	0	16	9·581 148	April 25	0	0	0	B. C. 4001
Table vii. Part i.	—		59	8·329 910	— 1				
SL′	=	359	17	1·251 238	April 24	0	0	0	B. C. 4001
Table x.	+	25	8	48.540 989					— 3292
SL′	=	24	25	49·792 227	April 24	0	0	0	B. C. 709
SL	=	24	25	49·792 255					
				— 0·000 028					

The proof of our four propositions is therefore complete, unless the data on which we proceed can be impugned; and in particular those corrections of the mean vernal equinoxes of the Tables which we have made in each instance. It would be easy to shew that the epoch of mean Julian longitude, having been left by the second miracle attached to April 24 at midnight, instead of April 25 at midnight, for the proper meridian, B. C. 4004, continued so attached to it ever after, and is so attached to it still. The calculation which we proposed supra[r] from the formula of Bessel is decisive of that fact.

It follows then that, besides the correction of 0h. 11 m. 9.6 sec. and that of 0 h. 0 m. 21.6 sec. of which our Table stands in need perpetually, it requires one of 12 h. from May 31 B. C. 1520 to May

[r] Page 517. Of the Introduction to the Tables, 212–218 Part iii. ch. i. sect. vii: 263 sect. xix.

31 B. C. 710; and another correction of 12 h. from May 31 B. C. 710 to the mean V. E. B. C. 672: or, what amounts to the same effect, it requires a correction of 12 hours from May 31 B. C. 1520 to May 31 B. C. 710, and a correction of 24, or one day, from May 31 B.C. 710 to the mean Vernal Equinox B. C. 672. And as it has happened that B. C. 672, at the ingress of Period xxviii, under the same impression as before, we lowered the Julian date of the mean Vernal Equinox one day *extra ordinem*, whereas it ought to have been retained, as we shall see by and by, the same in terms for Period xxviii, as for Period xxvii; this day must be restored. So that on the whole, and in point of fact, the corrections required by our Tables in Division B from the mean Vernal Equinox B. C. 672, the ingress of Period xxviii, downwards to the present day, in order to render them in all respects agreeable to the truth, are three in number; i. a correction of + 11 m. 9 sec. 36 th: ii. a correction of + 21 sec. 36 th: and iii. a correction of + 2 days, of the Julian dates of the equinoxes. The small correction of 21 sec. 36 th. for ordinary purposes may be still omitted: but it would be obviously improper to neglect the first, and much more the third, which is the greatest and most important, and yet the least to be questioned, and the most easily made, of all. There can be no doubt that our Tabular Julian equinoxes, from B. C. 672 forwards, are two days in defect of the true Julian dates of the mean equinoxes perpetually. And yet that very circumstance qualifies them to represent those of the true, from the same time forward; because the true equinoxes from B. C. 672 forwards, and even from before that time, have anticipated two days in terms on those of the mean, for every meridian; and nearly two days complete: and they do so still. So that in the Tabular dates without correction, from B. C. 672 downwards, you have a generally correct expression for the true equinoxes every year; and in the same dates, corrected as directed, you have an absolutely correct expression for the mean, first indeed and properly for the meridian of Jerusalem, secondarily and through that for any other.

This more just explanation of the effect produced by the two miracles on the relation of the mean annual natural time of our Tables to the mean annual Julian, and *vice versa*, makes no difference to the necessity of abridging the duration of a current Type of the Julian year on two distinct occasions by half its usual length. The effect would be the same in this respect, whether mean natural annual time fell back 12 hours on mean Julian, or mean annual Julian 12 hours on mean natural. A given Julian Type of the natural,

reckoned from midnight to midnight perpetually, according to a positive rule, must come to an end 56 years (= 12 hours' recession) sooner than otherwise. The only difference would be that, for a certain time after the first miracle, and until the anomaly introduced by that was redressed and rectified by the repetition of the same thing in the second instance, there would be 12 hours' interval in one and the same noctidiurnal cycle between the epoch of the Julian Type and that of the natural Antitype. The former would always be midnight. The latter, at the beginning of every fresh Type, would be 12 hours in advance of midnight. These things however will appear more plainly by and by.

It necessarily happened indeed that, before we had yet attained to a clear perception of the truth on these several points, we should be found repeatedly speaking of the mean equinoxes, when we should rather have spoken of the true*; or of those mean equinoxes not under their proper Julian dates: and that in some of our calculations we neglected the above corrections (the two first of the number) because we were not yet aware of the necessity of them. The small correction of 21.6 sec. indeed we have considered ourselves at liberty to neglect deliberately, where very great exactness was not required. Any other omission of the same kind we have taken other opportunities of correcting: and with respect to these oversights in general we are thankful to find, on a careful review of the former parts of our work, that nothing important has been affected by them, and that they are all such as the intelligent reader may easily rectify for himself, when once advertised of them.

We shall therefore conclude with proposing a Tabular Synopsis of the succession of the mean vernal equinoxes of our Fasti, such as they ought to have been exhibited in Division B of our General Tables at the beginning of each Period, from first to last; embodying consequently *all* the preceding corrections. We shall also include in it whatsoever is necessary to the more correct representation of the succession in the mean natural and in the mean or actual Julian year, which we exhibited Vol. i. 456; and in the mean natural, the mean Julian, and the equable year, which we proposed Vol. i. 623. We are aware too that certain alterations would likewise be required, in order to render the details of the Table which we exhibited Vol. i. 515 conformable in all respects to what we have

* As for example, in the discussion of the question at issue between ourselves and the author of the Ordo Sæclorum, Appendix to Diss. vi. vol. i. 530 sqq. though it makes no difference there to the question itself, or to the mode of reasoning by which it was determined.

hitherto been explaining. But there is no reason why that Table should not be retained even in its present state; and yet answer its proper purpose. The term indeed, which we compared therein, both in the hebdomadal and in the nundinal and in the sexagesimal succession, will not represent the mean vernal equinox, under its proper Julian denomination, at the beginning of every Period after B. C. 672; (in which capacity we proposed it;) but it will represent the true under its proper Julian name: and, in any case, it is a given *Julian* term, the same in each of those successions; and that is all which the object of the Table requires it to be.

Synopsis of the decursus of the mean Vernal Equinox in the Hebdomadal Cycle, in the Natural Year, in the Julian Year, and in the Equable Year, Cyclical and Nabonassarian.

Part i, A. M. 1 B. C. 4004 to A. M. 4229 A. D. 225.

Period	A. M.	B. C.	Length of Period	A	B	Feria	BB	Feria	C	From midnight. h. m. s. th.	CC	Feria	D Feria ia	D. L.	DD Feria ia	D. L.	DDD Feria	Æra Cyc.	E	Feria	F	E E	Feria	FF
i	1	4004	112		Apr. 23	6 5	Apr. 24	7 6	Apr. 25	0 0 21 36	Apr. 25	1 7	Apr. 25	C	Apr. 25	C	1 2	1	Thoth 1	1 7	0	Mesore 10	1 7	0
ii	113	3892	140	6	Apr. 22	4 3	Apr. 23	5 4	Apr. 24	3 10 26 24	Apr. 24	6 5	Apr. 25	C	Apr. 26	D	3 4	113	Thoth 27	6 5	26	Thoth 2	6 5	27
iii	253	3752	112	6	Apr. 21	2 1	Apr. 22	3 2	Apr. 23	1 8 2 24	Apr. 23	4 3	Apr. 25	C	Apr. 27	E	5 6	253	Phaophi 30	4 3	33	Phaophi 6	4 3	34
iv	365	3640	140	6	Apr. 20	7 6	Apr. 21	1 7	Apr. 22	4 18 7 12	Apr. 22	2 1	Apr. 25	C	Apr. 28	F	7 8	365	Athyr 26	2 1	26	Athyr 3	2 1	27
v	505	3500	112	6	Apr. 19	5 4	Apr. 20	6 5	Apr. 21	2 15 43 12	Apr. 21	7 6	Apr. 25	C	Apr. 29	G	9 10	506	Chœac 29	7 6	33	Chœac 7	7 6	34
vi	617	3388	140	6	Apr. 18	3 2	Apr. 19	4 3	Apr. 20	5 25 48 0	Apr. 20	5 4	Apr. 25	C	Apr. 30	A	11 12	618	Tybi 25	5 4	26	Tybi 4	5 4	27
vii	757	3248	140	6	Apr. 17	1 7	Apr. 18	2 1	Apr. 19	3 23 24 0	Apr. 19	3 2	Apr. 25	C	May 1	B	13 14	758	Mecheir 28	3 2	33	Mecheir 8	3 2	34
viii	897	3108	112	6	Apr. 16	6 5	Apr. 17	7 6	Apr. 18	1 21 0 0	Apr. 18	1 7	Apr. 25	C	May 2	C	15 16	898	Pharmuthi 1	1 7	33	Phamenoth 12	1 7	34
ix	1009	2996	140	6	Apr. 15	4 3	Apr. 16	5 4	Apr. 17	4 31 4 48	Apr. 17	6 5	Apr. 25	C	May 3	D	17 18	1010	Pharmuthi 27	6 5	26	Pharmuthi 9	6 5	27
x	1149	2856	112	6	Apr. 14	2 1	Apr. 15	3 2	Apr. 16	2 28 40 48	Apr. 16	4 3	Apr. 25	C	May 4	E	19 20	1150	Pachon 30	4 3	33	Pachon 13	4 3	34
xi	1261	2744	140	6	Apr. 13	7 6	Apr. 14	1 7	Apr. 15	5 38 45 36	Apr. 15	2 1	Apr. 25	C	May 5	F	21 22	1262	Paüni 26	2 1	26	Paüni 10	2 1	27
xii	1401	2604	140	6	Apr. 12	5 4	Apr. 13	6 5	Apr. 14	3 36 21 36	Apr. 14	7 6	Apr. 25	C	May 6	G	23 24	1402	Epiphi 29	7 6	33	Epiphi 14	7 6	34
xiii	1541	2464	112	6	Apr. 11	3 2	Apr. 12	4 3	Apr. 13	1 33 57 36	Apr. 13	5 4	Apr. 25	C	May 7	A	25 26	1542	Epagomene 2	5 4	33	Mesore 18	5 4	34
xiv	1653	2352	140	6	Apr. 10	1 7	Apr. 11	2 1	Apr. 12	4 44 2 24	Apr. 12	3 2	Apr. 25	C	May 8	B	27 28	1654	Thoth 23	3 2	26	Thoth 10	3 2	27
xv	1793	2212	112	6	Apr. 9	6 5	Apr. 10	7 6	Apr. 11	2 41 38 24	Apr. 11	1 7	Apr. 25	C	May 9	C	29 30	1794	Phaophi 26	1 7	33	Phaophi 14	1 7	34
xvi	1905	2100	140	6	Apr. 8	4 3	Apr. 9	5 4	Apr. 10	5 51 43 12	Apr. 10	6 5	Apr. 25	C	May 10	D	31 32	1906	Athyr 22	6 5	26	Athyr 11	6 5	27
xvii	2045	1960	140	6	Apr. 7	2 1	Apr. 8	3 2	Apr. 9	3 49 19 12	Apr. 9	4 3	Apr. 25	C	May 11	E	33 34	2047	Chœac 25	4 3	33	Chœac 15	4 3	34

Synopsis of the decursus of the mean Vernal Equinox in the Hebdomadal Cycle, &c. Part i Continued.

Period	A. M.	B. C.	Length of Period	A	B	Feria	BB	Feria	C	From midnight. h.	m.	s.	th.	CC	Feria	D Feria ia	D.L.	DD Feria ia	D.L.	DDD Feria	Æra Cyc.	E	Feria	F	Æra Nab.	EE	Feria	FF
xviii	2185	1820	112	6	Apr. 6	7 6	Apr. 7	1 7	Apr. 8	1	46	55	12	Apr. 8	2 1	Apr. 25	C	May 12	F	35 36	2187	Tybi 28	2 1	33		Tybi 19	2 1	34
xix	2297	1708	140	6	Apr. 5	5 4	Apr. 6	6 5	Apr. 7	4	57	0	0	Apr. 7	7 6	Apr. 25	C	May 13	G	37 38	2299	Mecheir 24	7 6	26		Mecheir 16	7 6	27
xx	2437	1568	56	6	Apr. 4	3 2	Apr. 5	4 3	Apr. 6	2	54	36	0	Apr. 6	5 4	Apr. 25	C	May 14	A	39 40	2439	Phamenoth 27	5 4	33		Phamenoth 20	5 4	34
xxi	2493	1512	140	6	Apr. 3	1 7	Apr. 4	2 1	Apr. 5	16	29	38	24	Apr. 5	3 2	Apr. 25	C	May 15	B	41 42	2495	Pharmuthi 9	3 2	12		Pharmuthi 3	3 2	13
xxii	2633	1372	112	6	Apr. 2	6 5	Apr. 3	7 6	Apr. 4	14	27	14	24	Apr. 4	1 7	Apr. 25	C	May 16	C	43 44	2635	Pachon 12	1 7	33		Pachon 7	1 7	34
xxiii	2745	1260	140	6	Apr. 1	4 3	Apr. 2	5 4	Apr. 3	17	37	19	12	Apr. 3	6 5	Apr. 25	C	May 17	D	45 46	2747	Paüni 8	6 5	26		Paüni 4	6 5	27
xxiv	2885	1120	140	6	Mar. 31	2 1	Apr. 1	3 2	Apr. 2	15	34	55	12	Apr. 2	4 3	Apr. 25	C	May 18	E	47 48	2887	Epiphi 11	4 3	33		Epiphi 8	4 3	34
xxv	3025	980	112	6	Mar. 30	7 6	Mar. 31	1 7	Apr. 1	13	32	31	12	Apr. 1	2 1	Apr. 25	C	May 19	F	49 50	3027	Mesore 14	2 1	33		Mesore 12	2 1	34
xxvi	3137	868	140	6	Mar. 29	5 4	Mar. 30	6 5	Mar. 31	16	42	36	0	Mar. 31	7 6	Apr. 25	C	May 20	G	51 52	3139	Thoth 5	7 6	26		Thoth 4	7 6	27
xxvii	3277	728	56	6	Mar. 28 Mar. 27	3 2	Mar. 29 Mar. 28	4 3	Mar. 30	14	40	12	0	Mar. 30 Mar. 29	5 4	Apr. 25	C	May 21	A	53 54	3279	Phaophi 8	5 4	33	20	Phaophi 8	5 4	34
xxviii	3333	672	140	6	Mar. 28	2 1	Mar. 29	3 2	Mar. 30	4	15	14	24	Mar. 30	4 3	Apr. 24	B	May 22	B	54 55	3335	Phaophi 21	4 3	13	76	Phaophi 22	4 3	14
xxix	3473	532	112	6	Mar. 27	7 6	Mar. 28	1 7	Mar. 29	2	12	50	24	Mar. 29	2 1	Apr. 24	B	May 23	C	56 57	3475	Athyr 24	2 1	33	216	Athyr 26	2 1	34
xxx	3585	420	140	6	Mar. 26	5 4	Mar. 27	6 5	Mar. 28	5	22	55	12	Mar. 28	7 6	Apr. 24	B	May 24	D	58 59	3588	Chœac 20	7 6	26	329	Chœac 23	7 6	27
xxxi	3725	280	140	6	Mar. 25	3 2	Mar. 26	4 3	Mar. 27	3	20	31	12	Mar. 27	5 4	Apr. 24	B	May 25	E	60 61	3728	Tybi 23	5 4	33	469	Tybi 27	5 4	34
xxxii	3865	140	112	6	Mar. 24	1 7	Mar. 25	2 1	Mar. 26	1	18	7	12	Mar. 26	3 2	Apr. 24	B	May 26	F	62 63	3868	Mecheir 26	3 2	33	609	Phamenoth 1	3 2	34
xxxiii	3977	28 A. D.	140	6	Mar. 23	6 5	Mar. 24	7 6	Mar. 25	4	28	12	0	Mar. 25	1 7	Apr. 24	B	May 27	G	64 65	3980	Phamenoth 22	1 7	26	721	Phamenoth 28	1 7	27
xxxiv	4117	113	112	6	Mar. 22	4 3	Mar. 23	5 4	Mar. 24	2	25	48	0	Mar. 24	6 5	Apr. 24	B	May 28	A	66 67	4120	Pharmuthi 25	6 5	33	861	Pachon 2	6 5	34
xxxv	4229	225	140	6	Mar. 21	2	Mar. 22	3	Mar. 23	5	35	52	48	Mar. 23	4	Apr. 24	B	May 29	B	68	4232	Pachon 21	4	26	973	Pachon 29	4	27

Synopsis of the decursus of the mean Vernal Equinox in the Hebdomadal Cycle, in the Natural year, in the Julian year, in the Gregorian year, and in the Equable year, Cyclical and Nabonassarian.

Part ii, A. M. 4229 A. D. 225 to A. M. 6049 A. D. 2045.

Period.	A.M.	A.D.	Lenth. of Period	A	B B	Feria	C	From midnight. h. m. s. th.	C C	Feria	D.L.	G	Feria	D.L.	H Feria 1	D.L.	H H Feria 4	D.L.	HHHH Feria	D Feria i	D.L.	D D Feria i	D.L.	DDD Feria	Æra Cyc.	E	Feria	F	Nab.	E E	Feria	FF
xxxv	4229	225	140	6	Mar. 22	3	Mar. 23	5 35 52 48	Mar. 23	4	B	Mar. 23	4	B	Mar. 23	B	Mar. 23	B	1	Apr. 24	B	May 29	B	68	4232	Pachon 21	4	26	973	Pachon 29	4	27
xxxvi	4369	365	140	6	Mar. 21	2	Mar. 22	3 33 28 48	Mar. 22	3	B	Mar. 23	3	C	Mar. 23	B	Mar. 24	C	2	Apr. 24	B	May 30	C	69	4372	Paüni 25	3	34	1113	Epiphi 3	3	34
xxxvii	4509	505	112	6	Mar. 20	1	Mar. 21	1 31 4 48	Mar. 21	2	B	Mar. 23	2	D	Mar. 23	B	Mar. 25	D	3	Apr. 24	B	May 31	D	70	4512	Epiphi 29	2	34	1253	Mesore 7	2	34
xxxviii	4621	617	140	6	Mar. 19	7	Mar. 20	4 41 9 36	Mar. 20	1	B	Mar. 23	1	E	Mar. 23	B	Mar. 26	E	4	Apr. 24	B	Jun. 1	E	71	4624	Mesore 26	1	27	1365	Epagome. 4	1	27
xxxix	4761	757	112	6	Mar. 18	6	Mar. 19	2 38 45 36	Mar. 19	7	B	Mar. 23	7	F	Mar. 23	B	Mar. 27	F	5	Apr. 24	B	Jun. 2	F	72	4764	Thoth 25	7	34	1505	Phaophi 3	7	34
xl	4873	869	140	6	Mar. 17	5	Mar. 18	5 48 50 24	Mar. 18	6	B	Mar. 23	6	G	Mar. 23	B	Mar. 28	G	6	Apr. 24	B	Jun. 3	G	73	4876	Phaophi 22	6	27	1617	Phaophi 30	6	27
xli	5013	1009	140	6	Mar. 16	4	Mar. 17	3 46 26 24	Mar. 17	5	B	Mar. 23	5	A	Mar. 23	B	Mar. 29	A	7	Apr. 24	B	Jun. 4	A	74	5017	Athyr 26	5	34	1758	Chœac 4	5	34
xlii	5153	1149	112	6	Mar. 15	3	Mar. 16	1 44 2 24	Mar. 16	4	B	Mar. 23	4	B	Mar. 23	B	Mar. 30	B	8	Apr. 24	B	Jun. 5	B	75	5157	Chœac 30	4	34	1898	Tybi 8	4	34
xliii	5265	1261	140	6	Mar. 14	2	Mar. 15	4 54 7 12	Mar. 15	3	B	Mar. 23	3	C	Mar. 23	B	Mar. 31	C	9	Apr. 24	B	Jun. 6	C	76	5269	Tybi 27	3	27	2010	Mecheir 5	3	27
xliv	5405	1401	140	6	Mar. 13	1	Mar. 14	2 51 43 12	Mar. 14	2	B	Mar. 23	2	D	Mar. 23	B	Apr. 1	D	10	Apr. 24	B	Jun. 7	D	77	5409	Phamen. 1	2	34	2150	Phamen. 9	2	34
xlv	5545	1541	112	6	Mar. 12	7	Mar. 13	0 49 19 12	Mar. 13	1	B	Mar. 23	1	E	Mar. 23	B	Apr. 2	E	11	Apr. 24	B	Jun. 8	E	78	5549	Pharmu. 5	1	34	2290	Pharm. 13	1	34
xlvi	5657	1653	140	6	Mar. 11	6	Mar. 12	3 59 24 0	Mar. 12	7	B	Mar. 23	7	F	Mar. 23	B	Apr. 3	F	12	Apr. 24	B	Jun. 9	F	79	5661	Pachon 2	7	27	2402	Pachon 10	7	27
xlvii	5797	1793	112	6	Mar. 10	5	Mar. 11	1 57 0 0	Mar. 11	6	B	Mar. 23	6	G	Mar. 23	B	Apr. 4	G	13	Apr. 24	B	Jun. 10	G	80	5801	Paüni 6	6	34	2542	Paüni 14	6	34
xlviii	5909	1905	140	6	Mar. 9	4	Mar. 10	5 7 4 48	Mar. 10	5	B	Mar. 23	5	A	Mar. 23	B	Apr. 5	A	14	Apr. 24	B	Jun. 11	A	81	5913	Epiphi 3	5	27	2654	Epiphi 11	5	27
xlix	6049	2045			Mar. 8	3	Mar. 9	3 4 40 48	Mar. 9	4	B	Mar. 23	4	B	Mar. 23	B	Apr. 6	B	15	Apr. 24	B	Jun. 12	B	82	6053	Mesore 7	4	34	2794	Mesore 15	4	34

EXPLANATION OF SYMBOLS.

PART I.—A. Hebdomadal epact at the end of each Julian Period of the Fasti.[l]

B. Epoch of the Noctidiurnal succession in the Julian year; 24 hours before that in B B.[m]

B B. Epoch of the Noctidiurnal succession in the mean natural year; 24 hours before the point of the succession in C C.[n]

C. Succession of mean Vernal Equinoxes in the natural year, under their proper Julian exponents, at the beginning of every Period; and the epoch of each in the Noctidiurnal Cycle as reckoned from midnight perpetually.

C C. Succession of mean Vernal Equinoxes in the Julian Types of the natural year, dated at midnight perpetually; and the feria of each at the beginning of every Period[o].

D. Epoch of origination of the Julian annual time of the Tables; i. e. the Julian date of the mean Vernal Equinox at the beginning of the first Period, supposed to continue the same in terms, and to represent the feria prima at the beginning of every Period perpetually[p].

D D. Gregorian date corresponding to this Julian one in D, at the beginning of every Period after the first; and the feria prima also.

D. L. Dominical Letter.

D D D. Numerical order of D D in the Noctidiurnal Cycle in the natural year, reckoned perpetually from C; i. e. from the first integral period of 24 hours at the beginning of every fresh Period, in the natural year, reckoned from midnight.

E. Cyclical date of C C; i. e. the equable Cyclical date of the mean Vernal Equinox, corresponding to the Julian, at the beginning of every Period.

E E. Nabonassarian date, corresponding to E, and through E to the Julian date in C C, at the beginning of every Period.

F. Precession of the Cyclical date of the mean Vernal Equinox from Period to Period also; or rise of the equable date in E in its own notation, in the course of every Period.

[l] Cf. vol. i. 463. Diss. vi. ch. iv. sect. ii: 467. sect. iii.

[m] Cf. vol. i. 523. note, Diss. vi. ch. v. sect. ix.

[n] i. 463. Diss. vi. ch. iv. sect. ii: 467, 468. sect. iii. iv.

[o] i. 463. D. Diss. vi. ch. iv. sect. ii.

[p] i. 465. H. I. Diss. vi. ch. iv. sect. ii.

F F. Precession of the Nabonassarian date of the mean Vernal Equinox from Period to Period also; or rise of the equable date in E E in its own notation, in the course of every Period.

PART II.—G. Gregorian date of the mean Vernal Equinox after A.D. 225, the ingress of Period xxxv; corresponding to the Julian one in C C perpetually.

H. Julian date of the first integral period of 24 hours reckoned from midnight, in the natural year, at the ingress of Period xxxv, A.D. 225; and of the first feria quarta in the hebdomadal Cycle; continuing ever after the same in terms in both respects. Cf. D, *supra.*

H H. Gregorian date corresponding to H at the beginning of every Period after the xxxvth; and the feria quarta also. Cf. D D, *supra.*

H H H. Numerical order of H H in the noctidiurnal cycle in the natural year, reckoned from G, at the beginning of every Period after the xxxvth perpetually. Cf. D D D *supra.*

REMARKS AND EXPLANATIONS.

The explanations which this Table and these Symbols still require have been in a great measure anticipated[q]. We shall confine ourselves at present to such points as are new, and concern the distinction between this Table and our former ones of the same kind.

i. It appears from this Synopsis that, at the ingress of Period xxi, B.C. 1512, the next in order after the date of the first miracle, the mean Julian equinox enters the Table in C C on April 5 the feria tertia at midnight; the mean natural or tropical equinox does so in C on April 5 the feria tertia also, but at 16h. 29m. 38 sec. 24 th. past the point of midnight in the regular order of the reckoning of the noctidiurnal cycle according to the Julian rule; and this may be considered and treated, in conformity to the positive rule of our Tables, as April 5th, on the feria tertia, at *noon.* We see then that, at the ingress of the Period next in course after the first miracle, there was 12 hours' interval, in the regular order of one and the same noctidiurnal cycle, between the epoch of the Julian Type of the natural year in that cycle and that of the natural year itself in the same; that the former was entering it at *midnight,* the latter at *noon.*

Now this was only the necessary consequence of the effect of the

[q] Vol. i. 463 sqq. 627 sqq.

first miracle on the relations of these two things to one another and to the noctidiurnal cycle, such as we have explained it. Did we go back to the beginning of things, after the occurrence of such an anomaly as that, (as we should be bound in strictness to do[r],) in order to discover the true epoch of the entire succession in C and C C respectively, adapted from the first to this change of relations between them which was actually introduced in Period xx, B. C. 1520; we should find the head of the latter (C C) already set back 12 hours in the contrary order of the natural decursus of the noctidiurnal cycle; yet still attached to midnight and not to noon. For the first actual noctidiurnal cycle under such circumstances must consist of 36 hours; i. e. of half of one mean cycle of the same kind and the whole of another. And yet this addition to the length of the first mean cycle must be made by extending the point of noon (so to say) in the natural order of such a cycle on one feria to the point of midnight on the next. The consequence of which would be that, at the beginning of the next revolution, when the cycle would again proceed in obedience to its proper law, the epoch of the Julian Type of the mean succession would be found attached to midnight, and that of the natural, 12 hours later, to the point of noon. The Julian succession must thenceforward be carried on *de facto* from April 24 at 12 hours; and yet *de facto* also from April 25 at midnight; and from 12 hours too, in the order of the noctidiurnal and in that of the hebdomadal cycle, before the natural. For one actual feria must now have acquired the power of denoting both the latter half of one mean one, and the whole of the next to it; the actual feria prima, reckoned from midnight to midnight, the mean feria septima reckoned from noon, and the mean feria prima reckoned from midnight: and one actual Julian term must now have become equivalent to the last 12 hours of one mean Julian term, and the whole of the next to it; April 25 for instance to half of April 24 and the whole of April 25. Yet the succession must be carried on in the style of April 25 not of April 24, and from the epoch of midnight, not from that of noon. The Julian succession therefore is now to be reckoned from April 25 on the feria prima at midnight; and therefore the natural (12 hours later) from April 25 at noon. And this distinction having been established between them, by virtue of the first miracle, it would continue to exist between them down to the time of the second; as in fact it is seen to have done: both from this time forward entering our Tables, at the ingress of every fresh Period, on the same feria of the hebdomadal cycle, and

[r] Cf. i. 303—305. Diss. v. ch. iii. sect. x.

on the same day in the Julian notation of those feriæ, but the one at midnight in both, the other at noon.

Again, at the ingress of Period xxviii, B. C. 672, the Period next in course after the date of the second miracle, we find the mean natural equinox entering the Table in C on the feria quarta, at 4 h. 15 m. 14 sec. 24 th. in the regular order of the cycle reckoned from midnight, which may be considered the same thing as midnight; and we find the mean Julian equinox in C C entering it at midnight on the feria quarta also. At the ingress of the Period then next after the second miracle we find both entering the Tables on the same feria, and at the same point in the regular order of the feria, and that the point most agreeable to the Julian rule, midnight; i. e. we find the relation originally established between them in this respect, which had been disturbed and interrupted by the first miracle, restored and reinstated by the second. But herein another anomaly begins to be perceptible at this moment, which did not appear before; viz. that the Julian date of the equinox in both cases at the ingress of this Period is the same as that at the ingress of the preceding one, March 30; though, according to the regular law of the descent of those dates from the first until now, if it was March 30 at the beginning of Period xxvii, it should have been March 29 at the beginning of Period xxviii.

But if we look further into the circumstances of the case, we see also that the Julian date of the ingress of Period xxvii, March 30, at that time was the feria quinta; and that of Period xxviii, March 30 also, is the feria quarta; though, according to the law of the descent of the equinox from Period to Period, in the order of feriæ from the first until now, if it was the feria quinta at the ingress of Period xxvii, it should have been the feria tertia at the ingress of Period xxviii. And yet the anomaly at this moment and in this respect is critically in proportion to that in the other, which affected the date of the equinox; and both are so to the law which has regulated each of those things until now: for if the feria at this time had been the feria tertia, then the date must have been March 29, and *vice versa:* and the actual date, at this time, March 30, is just the same in reference to the feria quarta as March 29 would have been in reference to the feria tertia.

The explanation of these phenomena is the same which we have already given of the former. Did we go back to the beginning of things after the second miracle, as we supposed ourselves to do after the first, we should find the decursus of the Julian succession already set back 24 hours behind that of the natural, yet each at-

tached to the point of midnight; only the former to the point of midnight, April 24, the latter to the point of midnight, April 25; the former to midnight on the feria prima, and the latter to midnight on the feria secunda. For we might argue in this instance as we did in the former, that by virtue of the joint effect of both miracles, now complete, one actual revolution of the earth about its own axis, (and properly the first of all,) must be supposed to have become equal to two mean ones, to two periods of 24 hours instead of one; that two feriæ in the mean succession in the hebdomadal cycle must have been absorbed in one actual feria in the same; that these two must have been the feria septima and the feria prima, and yet that of the two the feria septima must have been merged in the feria prima, not *vice versa*, and the succession of feriæ in the hebdomadal cycle must have been carried on in the style of the feria prima, not in that of the feria septima; that one mean Julian term April 24 must now have become equivalent to two, April 24 and 25; the former properly the representative of the feria septima, the latter of the feria prima; yet that the actual succession of such terms in constant connection with the feriæ which they represent must now have begun to be carried on in the style of April 24 the feria prima, not in that of April 24 the feria septima. The consequence of all this would be that, after the second miracle as well as the first, the entire succession of mean Julian time and Julian feriæ would be found attached to April 24 the feria prima; and that of mean natural or equinoctial to April 25 the feria secunda; and in that relation to these terms and to each other must they be supposed to have virtually if not actually proceeded from A.M. 1, B.C. 4004, down to A.M. 3333, B.C. 672 itself.

The radix or epoch then of the entire succession of each kind, and the relation of one to the other and to the noctidiurnal and the hebdomadal cycle, having undergone such a change; were the succession of Periods, such as we exhibit from A.M. 1 B.C. 4004 to A.M. 3333 B.C. 672, to be remodelled and reconstructed in a manner conformable to this change of the epoch; we should not have two Periods, at different times, each 56 years in length, but one Period of 112 years, equal to them both. Consequently from A.M. 1 B.C. 4004 to A.M. 3333 B.C. 672, we should have only 27 Periods, instead of 28; but the 27th would enter the Tables exactly at the same time as the 28th; that is, A.M. 3333, B.C. 672. And in these 27 Periods the mean vernal equinox would be found to have dropt 26 terms in the retrograde order of the Julian notation, i. e. from April 25 at midnight to March 30 at midnight;

and 5 terms (26—21) in the retrograde order of the feriæ of the hebdomadal cycle, from the feria secunda at midnight to the feria quarta at midnight: so that the state of the case, in these respects, in this new succession would be altogether the same A. M. 3333, B. C. 672, which it actually appears to be at the same point of time in our Synopsis. And it is manifest that it amounts to the same thing if, instead of going back to A.M. 1, B.C. 4004, at this period of the present succession we suppose the feria tertia to be merged in the feria quarta, and March 29 the proper representative of the former to be merged in March 30 the proper representative of the latter. The succession of mean vernal equinoxes in its proper Julian style and in its proper order both in the noctidiurnal and in the hebdomadal cycle, even from the first until now, must be carried on from this time forward in the style of the Julian March 30 and of the hebdomadal feria quarta.

It must therefore be true to say that at this moment, the ingress of Period xxviii A.M. 3333 B. C. 672, the radix or epoch of the entire succession of mean Julian annual time, including noctidiurnal and hebdomadal, is changed from April 25 the feria prima to April 24 the feria prima; and that of the entire succession of mean equinoctial, including noctidiurnal and hebdomadal also, from April 25 the feria prima, to April 25 the feria secunda; and that of the succession of equable time in the Cyclical corresponding to the natural, from Thoth 1 to Epagomene 5, in the Nabonassarian corresponding to the Julian, from Mesore 10 to Mesore 9; yet without any change in the proper feria of each.

It follows too from these premises, that the succession of feriæ in D D D, which was the feria 53ª at the ingress of Period xxvii, must be the feria 54ª, instead of the feria 55ª, at the ingress of Period xxviii; the date of the succession of feriæ having been changed from March 29 to March 30. The feria 54ª is the same thing reckoned from March 30 as the 55ª reckoned from March 29. It follows too that the Cyclical precession in F, through Period xxvii, which would otherwise have been only 12 terms in proportion to the length of the Period, in this particular case must be 13; and the Nabonassarian in F F, which would otherwise have been 13, in this instance must be 14. For the Julian style of the equinox B. C. 672 is now March 30, which would otherwise have been March 29; and it must require one more term in the equable notation to recover March 30 than to recover March 29. Besides which at this moment one equable term becomes virtually equivalent to two; Phaophi 20 for example to Phaophi 20 and 21: yet the

equable style in E must be carried on in Phaophi 21; to which from Phaophi 8, at the ingress of Period xxvii, the interval in the regular order of the equable notation is 13 terms, not 12.

ii. If we compare D D D and D D D, in the above Synopsis, before A.D. 225, with H H H and H H H after it; we shall perceive that there is only an accidental difference between them. The former set out from April 25 the feria prima; the latter from March 23 the feria quarta: the former the date of the mean vernal equinox B. C. 4004, the latter A. D. 225. D D rises one number on April 25, H H on March 23, every Period. D D however is always the same feria as April 25, and H H as March 23; i. e. each is really the same all along with the other though it is nominally different from it.

Now the relation of March 23 in H to the cognate terms in H H after A.D. 225 is that of a given Julian term to the corresponding Gregorian one. If so, that of April 25 in D to the cognate terms in D D before A. D. 225 must be the same. It is clear then that the succession in D D is as much Gregorian before A.D. 225 as that in H H after it. In principle D and D D, H and H H, are entirely the same; each as much Julian and each as much Gregorian as the other. The only difference between them is that D D is the relation of a Proleptic Gregorian type to D a Proleptic Julian type of the same kind, before A. D. 225; H H is that of the actual Gregorian to the actual Julian after A.D. 225.

iii. The relation of D D and D D D to C in this Table throughout should by all means be compared with that of C C and I to the fixed term of April 25, which we exhibited Vol. i. 456. It will appear from that comparison that D D and D D D bear just the same relation to C here, as C C and I to April 25 there: only that D D and D D D advance perpetually on C here, while C C and I recede perpetually on April 25 there. But the rate of the Precession here is just the same as that of the Recession there; two terms for every Period after the first. The interval from C to D D in terms of the noctidiurnal succession at the beginning of every Period here is the same as that from April 25 to C C there; only that it goes forwards in the order of the noctidiurnal cycle, not backwards. It is clear however that the noctidiurnal cycle itself proceeds in the same way in both instances. Now in the former Table we reckoned from the proper Julian epoch of the noctidiurnal succession, in a regular series of Julian exponents, differing by unity only, up to a Julian term *communis generis* with the rest, supposed to continue the same in terms perpetually, April 25; in this latter one we reckon from the proper

epoch of the same succession in the natural year, (from the first period of 24 hours in the natural year, represented by C,) up to a similar term represented by D D; not indeed perpetually the same in terms, but virtually and in reality always the same in itself, because always the same with a term which is the same in terms perpetually, represented by D.

It must therefore be evident that the succession from C to D D here is the same in principle as that from C C to April 25 before. There is only an accidental difference between them. The latter represented the simple succession of noctidiurnal time in annual Julian under its proper Julian nomenclature; the former represents the same simple succession in annual natural under its proper Julian nomenclature too. This Julian nomenclature is not the same in each instance, it is true; but the course and succession of noctidiurnal time is the same under each: and whatsoever difference there may be in the style of each compared with that of the other, it is the same in principle with one which is or ought to be familiar to all of us; the difference in the style of the Julian and that of the Gregorian reckoning of the same thing respectively.

iv. Again, if we look at G in this Table, Part ii, as merely a fixed Julian term March 23, which A.D. 225 represented the mean vernal equinox, the first day of the mean natural year; and if we compare it with the terms in CC, which are the proper Julian dates of the mean equinoxes after A.D. 225; we shall see that these latter drop one number on G with every Period: i. e. the first day of the mean natural year recedes one cycle of 24 hours in every Period on the given Julian term which A.D. 225, at the ingress of Period xxxv, represented itself. We see then that after A.D. 225 the head of the mean natural year descends on a fixed Julian term at an uniform rate every Period; viz. 24 hours, or one noctidiurnal cycle. The same thing, *mutatis mutandis*, holds good in CC compared with DD, before A.D. 225. The head of the mean natural year descends on a fixed Julian term, with which it coincided itself at the beginning of all our Periods, April 25, at an uniform rate in terms of the noctidiurnal cycle every Period: only not at the same rate before A.D. 225 as after. It is at a rate twice as great before A.D. 225 as after; 48 hours, or two noctidiurnal cycles, before, 24 hours, or one, after.

The explanation of this difference however is that after A.D. 225 the mean natural year recedes in an actual, that is, a fixed and invariable, Type of one and the same thing (the Julian succession of Noctidiurnal, Hebdomadal, and Annual time all in conjunction);

before A.D. 225 it does so in an hypothetical and proleptic, and therefore necessarily a variable, one. Now this, as we observed before[s], must make a very great difference. It would be contrary to the reason of things, and even a contradiction in terms, to assume that every thing must have proceeded in the same way in the decursus of mean natural annual time in noctidiurnal, hebdomadal, and annual in the sense of Julian, while there was yet no such thing in existence as the actual Julian succession of that kind, and when there was. There must be a difference in this respect of some kind or other, before and after; and it appears that the distinction *de facto*, laid down by nature itself, both to discriminate the actual succession of natural time in Julian nominally so called, from the same thing in actual, and also to shew that it was regulated by one and the same rule in principle perpetually, was *this:* viz. That while there was no such thing in existence as the actual Julian year, that is, from B.C. 4004 to A.D. 225, the descent of natural annual time in noctidiurnal and hebdomadal and annual in the sense of Julian should proceed in the *same* way in general, as when there was, but at *twice* the same rate: and consequently that, if the proper measure of this descent from Period to Period after A.D. 225 was one period of 24 hours of mean solar time, before A. D. 225 it should be two. And it must be evident to our own common sense, that the relation of a fixed course and succession of things like the natural year, always actual and always the same with itself, to a variable form of the same thing, in the shape of the Julian year, at one time, and to an invariable form, as much actual as itself, at another, might be expected *a priori* to exhibit a distinction like this.

We observe too that, when a given Julian term like March 23 in G or H, (Part ii of the Table,) has ceased to represent a given term in the natural, (the first day in the natural year, for example,) it begins to represent the second; and when it ceases to represent the second, it begins to represent the third; and so on. In short, having once begun to represent a given period of 24 hours in the mean natural year, under certain circumstances, it never ceases to represent some other, at the proper time and under the same circumstances, numerically derivable from that which it represented at first; a fresh term of that kind at the beginning of every Period. We see that this holds good after A. D. 225, from the mere inspection of CC and G, and H and HH and HHH, in Part ii of the Table. The same thing holds good, *mutatis mutandis*, before A. D. 225 also. The first Julian and the first natural term of this kind in

[s] Vol. i. 479. Diss. vi. ch. iv. sect. vi.

the first part of the Table are represented by D and DD; which nominally indeed differ after Period i, but in reality are the same all along. The numerical order of DD in the feriæ of the natural year, (i. e. in the succession of uniform periods of 24 hours, reckoned from the beginning of the natural year at the ingress of every Period,) is represented in DDD; and we see that when DD has ceased to denote the feria prima, (i. e. the first such period,) it begins to denote the feria tertia, (i. e. the third;) and when it ceases to denote the third it begins to represent the fifth: and so on, rising two terms in the numerical order of the reckoning of such periods from the beginning of the natural year, with every change of the Julian Type of that year itself. Now this is in principle just the same thing as that which goes on after A. D. 225 also; only at twice the same rate of a common decursus of a certain kind before A. D. 225 as after. The law of the decursus is the same in general, both before and after A. D. 225. Its application varies according to circumstances; as it might naturally be expected to do, where the circumstances themselves were so different.

If the question then is asked, By what means, on such a principle as this, is the actual continuity of natural annual time in terms of Julian, including noctidiurnal and hebdomadal as well as annual, maintained unbroken before A. D. 225? there is not much more difficulty in answering this question before A. D. 225 than after. After A. D. 225 indeed, and according to the positive rule of our Fasti, the head of the natural year recedes through each of our Periods from midnight to midnight perpetually, in the order of noctidiurnal, and in that of hebdomadal, and in that of annual, in the sense of Julian, time all at once. The head of this year at the ingress of every Period is always in contact with the point of midnight; and always with midnight on the next lower feria, and on the next lower Julian term, to that with midnight on which it was in contact the Period before. What there is analogous to this before A.D. 225, may require some little explanation: and to make it intelligible we will beg leave to revert to the first case of the kind, that of the descent of natural annual time in terms of noctidiurnal and hebdomadal, from Period i of our Fasti to Period ii, to which we alluded before[t].

The first integral period of 24 hours in the natural year entered our Tables at midnight on the feria prima. It fell back in the course of the Period to midnight on the feria septima. Why then, it may be demanded, must not the first cycle of 24 hours in the

t i. 481, Diss. vi. ch. iv. sect. vi.

natural year at the ingress of Period ii be reckoned from the feria septima? So it would be, we answer, if the *head* of the natural year at the ingress of Period ii were supposed to be in contact with midnight on the feria septima, as it was at that of Period i with midnight on the feria prima. But this is precisely the state of the case in the constant descent of the head of the natural year from Period to Period after A. D. 225; and therefore it cannot be the state of the case with it before A. D. 225, and from the first. The real explanation of the state of the case, before A. D. 225 and from the first, we apprehend to be *this;* that when the head of the natural year has receded 24 hours exactly in the proleptic Julian Type of the same thing, (of which we make use perpetually, down to A. D. 225,) from midnight to midnight; the *end* of the first cycle of 24 hours, in that year, not the *beginning*, is now to be supposed to be in contact with the point of midnight. This may not be an obvious distinction; and yet it is a just one, and founded in the reason of things. It makes all the difference in the respective relation of a proleptic and of an actual Type of the natural year in the form of the Julian, to the natural year itself. And yet it is evident that the continuity of natural annual time in Julian is kept up on this principle in a proleptic Julian Type of natural before A. D. 225, as much as in the actual after. The beginning of the first cycle of 24 hours is in contact with midnight perpetually at the ingress of every fresh Period after A. D. 225; the end is so before. But the continuity of natural annual time in Julian, including noctidiurnal and hebdomadal, from Period to Period, is never interrupted before A. D. 225, no more than after. The first cycle of 24 hours never ceases to be in contact with midnight at the proper point of every Period, from the beginning to the end of our Tables; only that before the proper time its beginning is in contact with midnight on one feria at the ingress of one period, and its end is so with midnight on the next feria, at the ingress of the next: so that, *de facto*, the descent of the natural year, from the beginning of this first cycle in one Period to its beginning in the next, in the order of feriæ, is through two terms perpetually down to A. D. 225; instead of one. Thus, in the case which we began with considering: at the ingress of Period ii the end of the first cycle of 24 hours in the natural year was midnight on the feria septima; consequently its beginning was midnight on the feria sexta: i. e. it had dropt, in the course of one Period *de facto* from midnight on the feria prima to midnight on the feria sexta; two terms, not one: and yet it had not ceased even at the end of the Period to be in contact with midnight on the feria

septima. And midnight on the feria sexta being now the proper head of the natural year at the ingress of Period ii; midnight on the feria quinta was the proper epoch of the noctidiurnal succession in the natural year for the decursus of that Period: because it must be 24 hours behind the head of the natural year itself[v].

The assumption to which we have just adverted, viz. that the proper epoch of the noctidiurnal succession in annual natural in each of our Periods, (not excepting the first of all,) must be set back 24 hours before the ingress of the natural year itself, was explained and defended in the proper place before[v]. Nor is there any difficulty in it, if the time of the present system of things, which bears date from the Mosaic Creation, in all and singular its measures is in reality the continuation of a preexisting system of time of the same kind, the beginning of which who shall tell? And yet (if we may without impropriety speculate on so mysterious a subject and as yet so entirely concealed from our own knowledge); it would seem to be altogether reasonable to suppose that, could we go back to the very beginning of this system, we should find both its noctidiurnal and its annual time taking their rise absolutely at once.

And here the fact which we *do* appear to have ascertained, viz. that the true mean natural annual time even of the existing system of things bears date not from midnight in the noctidiurnal cycle, but from 21·6 sec. past the point of midnight, as we have already observed, is very significant. The proper period of the mean natural annual time of this system in the mean Julian is 129 of its proper years; and in determining this period, and consequently in both fixing and maintaining this proper relation of the mean natural annual time of the system to the mean Julian, no element is more influential and more important than this very minute quantity of 21·6 sec. of mean solar time.

There is a period of 4000 mean natural years, into which this element enters, and of which it is ultimately the basis; which brings back the mean annual natural time of the system to the same epoch of the noctidiurnal cycle, and to the same year of the cycle of leap-year, proper to the system also: but not to the same year of the period of 129 years, nor to the same year of the cycle of 28 years, nor consequently to the same feria in the hebdomadal cycle, nor to the same day in the mean annual Julian time of the system[x]; because it is made up of 31 cycles of the period of 129 years *plus* the first year of one more.

[v] i. 468—473, Diss. vi. ch. iv. sect. iv. Introduction to the Tables, 229 sq.
[x] i. 234, Diss. iv. App. ch. ii. sect. ii. Part iii. ch. i. sect. xiv.

There is another period of 516 000 mean natural years, of which this element is also the basis; which brings back the mean annual natural time of the system to the same epoch in the noctidiurnal cycle, the same year in the cycle of leap-year, and the same year of the period of 129 years; because it is made up of 129 × 4000[y]: but not to the same year of the cycle of 28, nor consequently to the same feria in the hebdomadal cycle; nor yet to the same term in the mean Julian time of the system also.

There is a third period of 3 612 000 mean natural years of the system[z], into which this element enters also; which restores the mean natural annual time of the system to the same epoch of the noctidiurnal cycle, the same year in the cycle of leap-year, the same year in the period of 129, the same year in the cycle of 28, and therefore the same feria of the hebdomadal cycle; because it is made up of 129 000 × 28, or 516 000 × 7: but it does not bring it back to the same term in the mean annual Julian also.

There is a fourth period, the product of 3 612 000 × 365·25 × 4 (i. e. of 1 319 283 000 × 4 or 5 277 132 000) mean natural years of the system, which would bring back to its proper mean annual time to the same epoch of the noctidiurnal cycle, the same year of the cycle of leap-year, the same year of the period of 129 years, the same year of the cycle of 28 years, the same feria of the hebdomadal cycle, and the same term in the mean annual Julian time of the system, all at once: into which too this element must enter at bottom as much as into the rest. And great as this period may appear, and almost too much for the human comprehension to grasp at present; it must be only the proper period of a system like that which exists *de facto* at present: in which the cycle of one day, the cycle of seven days, the cycle of 365·242 25 days, and the cycle of 365·25 days, the cycle of four years, and the cycle of 28 years[a], each according to its proper law, do make, and as far as we can judge always have made, a constituent part. And great as this period seems, it may be, even as we have stated it, far, very far short of the truth. For, as the cycle of 365 days has made from the first, and still does make, a most important part of the same system; the proper Period of the system which restores all its component parts to their original relations, must include this too. And besides the mean solar time of the system in every form and of every denomination; it has its mean lunar, its mean sidereal, and its mean anomalistic also: to combine each of which with the rest, in its proper proportion, and to

y ii. 31, Diss. ix. ch. i. sect. viii.
z i. 496, sqq. Diss. vi. ch. iv. sect. xii.
a Cf. the Introduction to the Tables, 148. Part ii. ch. iv. sect. i.

form one great and comprehensive PERIOD out of the particular periods of all, a PERIOD which should bring back one and all at the same moment to the relations of origination, whatsoever they were, might possibly exceed the capacity of an angel, much more of the human mind at present. Yet such a period may exist; and for ought we know to the contrary may even now be going on, yet even now not for the first time: and what is more it may always have been measurable and may always *de facto* have been measured, and may still be so[b], by the proper noctidiurnal cycle of our own earth; and through that by this apparently slight and insignificant quantity of 21·6 sec.: which nevertheless is an integral part of that cycle, and measures it exactly.

It is therefore a significant circumstance that the mean natural annual time of this system from the epoch of the Mosaic creation downwards appears to have been attached to this term of 21.6 sec. past the point of midnight. If a period of 4000 years, such as we began with enumerating, came to an end at 18 hours from midnight B. C. 4133, in the first year of the cycle of leap-year; then it is easy to shew that the first cycle of 129 years, in the next, would come to an end, and the second would begin, at 0 h. 0 m. 21.6 sec. past midnight, in the second year of the cycle of leap-year, B. C. 4004. For the epact of the mean natural year of our standard in 129 years accumulates to 7 days, 6 h. 0 m. 21·6 sec. exactly. Consequently, if its epoch in the noctidiurnal cycle, B. C. 4133, in the first year of the cycle of leap-year was 18 hours from midnight; its epoch B. C. 4004 in the same noctidiurnal cycle would be 18 h. + 6 h. 0 m. 21·6 sec. from midnight: that is, 0 h. 0 m. 21.6 sec. past the point of midnight, in the second year of the second period of 129 years, and in the second year of the cycle of leap-year also; which appears to have been the state of the case exactly, at the epoch of the Mosaic creation, B. C. 4004.

We know not whether we are exceeding the limits of propriety in arguing any thing even from such coincidences as these; but if the several periods which we have mentioned do really make a part of one and the same system, and that our own, each in its proper order and proper proportion too: then the fact that a period of 4000 years would thus appear to have begun B. C. 4133, in the first year of the period of 129 years, and in the first year of the cycle of leap-year, would seem to imply that a greater period of 516 000 years must have come to an end at the same time also; because *that* is the period which would bring back the mean equinoctial time of the

[b] Cf. Fasti, ii. 365 note. Diss. xi. ch. iv. sect. vi.

system to the same epoch of the noctidiurnal cycle, the same year of the cycle of leap-year, and the same year of the period of 129 years, and the same year of the period of 4000 years, all at once. In this case however the proper epoch of the equinoctial time of the system in the noctidiurnal, B. C. 4133, would be that of the Period of 516 000 years from the first; and if it was that of *this* Period from the first, it must be that of the system itself from the first. Now that this epoch B. C. 4133 must have been 18 hours from midnight may be seen from our own Tables in B. C. 133, when the epoch was 17 h. 48 m. 28·8 sec. Increase this by 11 m. 31·2 sec. and it becomes 18 h. 0 m. 0 sec. exactly: which must consequently have been the epoch 4000 years before, B. C. 4133.

The proper annual time then of the system and the proper noctidiurnal would thus appear to have begun together some time or other, exactly 18 h. from midnight; i. e. exactly in conformity to the primitive rule of the noctidiurnal cycle of our own system itself. In this case, and at this point of time, we could not have assumed the epoch of the noctidiurnal succession, *per se*, 24 hours behind that of the annual. But at the end of one Period of 516 000 years, in which there would be 188 465 001 mean solar days, (3 999 less than in 516 000 mean Julian years = 188 469 000 mean solar days;) the epoch of the annual succession would be found attached to a point in the noctidiurnal cycle just 24 hours in advance of that from which it set out: i. e. to 18 hours from midnight indeed as at first, but on a different feria of the hebdomadal cycle, and on a different Julian term. In this case it must be self-evident that the epoch of the annual succession in the second Period of 516 000 years, and that of the noctidiurnal, must be distinct things; the former 24 hours in advance of the latter. The distinction thus introduced at the end of the first Period would continue to characterize every other, down to the completion of the still greater Period of 3 612 000 years at least, which only would bring back the epoch of the annual succession to the same feria of the hebdomadal cycle and of the solar cycle as at first; if not to that of the still greater one of 5 277 132 000 years, which would be necessary to bring it back to the same Julian term as at first also.*

* The mean tropical year advances 21·6 sec. of mean solar time, in the order of the noctidiurnal cycle, in the course of one period of 129 years of its own denomination. Consequently, in 129 × 4000, or 516 000 such years, it advances an entire period of 24 hours; because 21·6 sec. × 4000 = 24 hours exactly.

It follows that, if this be supposed to go on long enough, in 516 000 × 365·25 years of its own denomination, i. e. in 188 469 000 mean tropical

CHAPTER III.

On the effect produced by the two miracles upon the mean longitude of the moon.

We shall now proceed to consider the question hitherto reserved for future discussion[c]; viz. that of the effect produced by the same

years, it must advance through every day in the mean Julian year in its turn, and come round to the same again. Diminish the number of mean tropical years, in which this effect takes place, by 3 999, and you will obtain the corresponding number of mean Julian years; viz. 188 465 001. Consequently 188 469 000 mean tropical years = 188 465 001 mean Julian. This is shewn by the reduction of both to days and nights:

188 469 000 × 365·242 25 = 68 836 841 615·25 days
188 465 001 × 365·25 = 68 836 841 615·25 days.

In each of these periods, we perceive, there is an excess of 0·25 days, or 6 hours, over the last complete cycle of day and night which enters each. It follows that though mean tropical time and mean Julian would return to the same day at the end of 188 469 000 mean natural years and 188 465 001 mean Julian; they would not return to the same time of the day; i. e. to the same epoch of the noctidiurnal cycle. The case therefore would be precisely the same at the end of one such period as this, great as it is, as if it were nothing more than the end of the first year of an ordinary cycle of the Julian leap-year. To get the true period of restitution in such a cycle of leap-year as this, we must multiply each of these periods by 4.

188 469 000 m. tr. y. × 4 = 753 876 000
188 465 001 m. J. y. × 4 = 753 860 004.
753 876 000 × 365·242 25 = 275 347 366 461 days.
753 860 004 × 365·25 = 275 347 366 461 days.

It follows that in 753 876 000 mean natural years, 753 860 000 mean Julian years, mean annual tropical time and mean annual Julian time would return to the same day and to the same time of the day perpetually. But they would not return to the same feria: for neither of these periods is divisible by 28. To get the period which would bring both back to the same Julian epoch, the same noctidiurnal one, and the same hebdomadal one, perpetually, we must multiply even this period by 7.

753 876 000 m. tr. y. × 7 = 5 277 132 000
753 860 004 m. J. y. × 7 = 5 277 020 028
5 277 132 000 × 365·242 25 = 1 927 431 565 227 days.
5 277 120 028 × 365·25 = 1 927 431 565 227 days.

188 469 000 × 28 = 5 277 132 000

the number of cycles of 28 in this number of mean trop. yrs.

188 465 001 × 28 = 5 277 020 028

the number of cycles of 28 in the corresponding number of mean Jul. yrs.

[c] i. 306. Diss. v. ch. iii. sect. xii.

two miracles on the continuous reckoning of the mean lunar momenta, (by which we understand the mean longitude more particu-

This may give us some idea of the way in which mean noctidiurnal time, mean hebdomadal, mean annual tropical, and mean annual Julian, for ought which we know to the contrary, may always have been blended, and always have proceeded, together in a system like the present which *de facto* combines them all. What can be inferred from such premises as these, but that the true cycle of leap-year of such a system is one of

753 876 000 mean tropical years,
753 860 004 mean Julian years?

and the true solar cycle of such a system is one of

5 277 132 000 mean tropical years.
5 277 020 028 mean Julian years?

But besides its mean annual natural and its mean annual Julian time the system has its annual equable time also. Let us consider this as simply the equable in the sense of cyclical. If the mean tropical year receded four days on the mean Julian in 129×4 or 516 mean tropical years; the equable cyclical would recede on the natural $129 - 4$, or 125 days, in the same length of time also: and in 516×1000 or 516 000 mean natural years it would recede 125×1000 or 125 000 days. But in reality the mean natural year gains one day on the mean Julian every 516 000 years. Therefore the equable must recede one day more on the natural in the same length of time; i. e. 125 001 days, and not 125 000. This one day *extra* in one period of 516 000 years would amount to one equable year in $516\,000 \times 365$ years: and the recession of equable cyclical annual time on mean natural annual in that space of time would amount to $125\,001 \times 365$ days, i. e. 125 001 equable years exactly. It follows that the period of restitution of these two kinds of mean annual time in conjunction is

$516\,000 \times 365$ m. trop. yrs. = 188 340 000
and $516\,000 \times 365$ or 188 340 000 equable years
+ 125 001 more
i. e. 188 465 001 equable years.

and this is proved by the reduction of both to days and nights.

$188\,340\,000 \times 365{\cdot}242\,25 = 68\,789\,725\,365$ days.
$188\,465\,401 \times 365 = 68\,789\,725\,365$ days.

So that the true Sothiac period of equable cyclical in mean natural annual time is one of

188 340 000 mean natural years,
188 465 001 equable years,

in the course of which the equable would revolve 125 001 times round the natural year, and in the complex of which there would be 125 001 more equable years than natural. And if the proper mean lunar time of the equable solar year accompanied this perpetually, and its proper period in the equable solar year was 600 such years perpetually; it could not be restored

larly,) and of the manner in which that also is to be taken into account.

For this purpose, we shall have to institute various calculations;

to the relations of origination simultaneously with this in less than 188 465 001 × 600 equable years: for 188 456 001 divided by 600 = 314 108, with a remainder of 201.

It has been shewn[a] that 25 885 mean tropical years equal 25 884 mean sidereal years; and that both contain 9 454 295·641 25 mean solar days. The period therefore of the restitution of mean annual tropical time in terms of mean sidereal would be 25 885 mean tropical years, 25 884 mean sidereal. But neither would return at the end of this interval to the same day in the Julian year, or to the same epoch in the noctidiurnal cycle, or on the same feria of the hebdomadal: though the above number of days is divisible by seven.

In like manner we have shewn in the introduction to our Tables[b] that the precession of the mean anomalistic time of our standard on the mean tropical amounted to one quarter of the mean tropical year at the winter solstice A. D. 1245; i. e. in 5248·75 years. Consequently, in 5248·75 × 4 or 20 995·00 years it must amount to an entire year. The period therefore of the restitution of the mean tropical time and of the mean anomalistic time of our standard is 20 995 mean anomalistic years, 20 996 mean tropical. And this is proved by the reduction of both to days and nights:

	d.	h.	m.	s.
20 995 anomal. years =	7 668 626	6	49	23·627 609 361 989
20 996 mean trop. yrs. =	7 668 626	6	44	38·4
			4	45·227 609 361 989

This small difference is merely the amount of correction which our mean anomalistic standard would require at the end of this great period. For the standard itself is slightly in excess; because the annual rate of the proper motion of the apsides, 11″·66, which we assume, is slightly in excess also[c]. It amounted to 1 m. 11 s·306 902 340 497 25, in one quarter of the period[d]: and the above is only this quadrupled.

We shall not attempt to pursue this subject any further, or to compound these various periods in one common and comprehensive period, which should restore these several kinds of mean annual time both in themselves and with reference to any thing else to the relations of origination, simultaneously and perpetually. And yet there are two more elements at least, which ought to enter into such a period; of neither of which have we said any thing: one, mean lunar in conjunction with mean Julian and mean natural time; and the other, annual equable in the sense of Nabonassarian, in conjunction with mean Julian, mean natural, and equable cyclical also.

With regard to equable time in the sense of Nabonassarian, it is first

[a] iv. 147.
[b] Page 205. Part. iii. ch. i. sect. v.
[c] See the Introduction, 203. Part. iii. ch. i. sect. v.
[d] Ibid. 205.

each of which we must endeavour to execute with as much care and exactness as may be possible. And as it is by all means desirable that not only our readers in general, but men of science in particular, should be enabled to judge of these for themselves; we must not be satisfied with merely stating the results of our calculations in each instance, but we must exhibit their various steps and details also.

We shall begin with the full moon of May next before the date of the first miracle; i. e. before May 31 B.C. 1520.

i. Calculation of the full moon of May B. C. 1520, for the meridian of the ancient Jerusalem. Second year of the cycle of leap-year. Epoch, April 29 at 12 h. A. D. 1801. Interval, 3320 mean Julian years. Secular correction, 33·2 centuries. Mean V. E. B. C. 4004 to mean V. E. B. C. 1520, 2484 mean tropical years[d].

and properly to be referred to mean annual in the sense of Julian: and its relation to that is such that 1460 mean Julian years must equal 1461 Nabonassarian; and *vice versa*.

Now 129 000 × 1460 = 188 340 000: from which it follows that in 188 340 000 mean Julian years there will be

$$\begin{array}{r} 188\,340\,000 \\ +\quad 129\,000 \\ \hline \text{or}\quad 188\,469\,000 \end{array}$$

Nabonassarian years. This is proved by the reduction of both to days and nights.

$$188\,340\,000 \times 365{\cdot}25 = 68\,791\,185\,000 \text{ days}$$
$$188\,469\,000 \times 365 = 68\,791\,185\,000 \text{ days}$$

Equable annual time then in the sense of Nabonassarian and mean annual in the sense of Julian would be restored to the relations of origination perpetually in 188 340 000 mean Julian years, 188 469 000 Nabonassarian. We have seen that the same thing holds good of equable annual in the sense of cyclical, and mean annual in the sense of natural, in the period of 188 340 000 mean natural years, and 188 405 401 cyclical years.

$$\begin{array}{rl} \text{Now, } 188\,469\,000 \text{ Nab. y.} = & 68\,791\,185\,000 \text{ days} \\ 188\,465\,001 \text{ Cyc. y.} = & 68\,789\,725\,365 \text{ days} \\ \hline \text{The difference} = & 1\,459\,635 \text{ days} \end{array}$$

And these = 3 999 × 365 exactly: and 3 999 also is the difference of 180 469 000 and 188 465 001. It follows that 188 469 000 Nab. years would contain 3 999 more than 188 465 001 cyclical; and that, as the equable cyclical year would revolve 125 001 times round the natural in 188 340 000 mean natural years, the equable Nabonassarian would revolve 129 000 times round the mean Julian in 188 340 000 mean Julian years.

d Cf. vol. iii. 511. Diss. xv. ch. ix. sect. iv. Introduction to the Tables, 202. Part iii. ch. i. sect. v: 206. sect. vi. vii: 219—226. sect. viii.—sect. xi: 276. ch. ii. sect. iii.

			h.	m.	s.	
i. S L.	..	April 5	17	47	24·0	Mean Tab. V. E. B. C. 1520
	Correction		+	11	9·6	
		April 5	17	58	33·6	True mean V. E. at Jerusalem
	=	April 5	15	37	46·6	At Greenwich
		+ 54	20	22	13·4	
		May 30	12	0	0·0	

		°	′	″		h.	m.	s.
S L	=	0	0	0·0	April 5	15	37	46·6
		+ 54	3	41·518	+ 54	20	22	13·4
S L	=	54	3	41·518	May 30	12		
S L + 180°	=	234	3	41·518	May 30	12		

		°	′	″		h.	m.	s.	
ii. M L.	Epoch	31	13	1·811	April 29	12	0	0	A. D. 1801
	3320 years	− 213	33	15·860					− 3320
		117	39	45·951					
	Corr. 33·2 C	+ 3	5	11·036					
M L	=	180	44	56·987	April 29	12			B. C. 1520
		+ 48	28	5·837	+ 31				
M L′	=	229	13	2·824	May 30	12			

		°	′	″	
iii. S L′. } iv. M L′. }	S L + 180° =	234	3	41·518	
	− M L =	− 229	13	2·824	
	D =	+ 4	50	38·694	May 30 12

	°	′	″		h.	m.	s.
D′ =	0	21	44·484	T′ =	0	39	36·038
D″ =		1	37·580	T″ =		2	57·736
D‴ =			7·299	T‴ =			13·294
D⁗ =			0.546	T⁗ =			0·995
D′′′′′ =			0·040	T′′′′′ =			0·073

D′ D″ D‴ D⁗ D′′′′′ =	+ 0	23	29·949	T′ T″ T‴ T⁗ T′′′′′ =	+ 0	42	48·136
D .. =	+ 4	50	38·694	T .. =	+ 8	49	23·514
D D′ D″ D‴ D⁗ D′′′′′ =	+ 5	14	8·643	T T′ T″ T‴ T⁗ T′′′′′ =	+ 9	32	11·650

	°	′	″			h.	m.	s.
S L =	54	3	41·518	v. M T =	May 30	12	0	0
+ D′ D″ D‴ D⁗ D′′′′′ =		23	29·949	T T′ T″ T‴ T⁗ T′′′′′ =	+	9	32	12
S L′ =	54	27	11·467 }	vi. M T′ =	May 30	21	32	12
S L′ + 180 = M L′ =	234	27	11·467 }					

		° ′ ″	h. m. s.	
vii. A L.	2484 y.	42 35 36·179	April 5 15 37 46·6	B.C. 1520
		+ 9·336	+ 55 6	
A L′	=	42 35 45·515	May 30 21 37 46·6	

		° ′ ″	h. m. s.	
viii. P L.	Epoch	280 39 4·766	April 29 12 0 0	A.D. 1801
3320 yrs.	=	−92 20 11·146		−3320
		188 18 53·620		
Corr. 33·2 C.	=	−11 25 32·867		
		176 53 20·753	April 29 12 0 0	B.C. 1520
		+ 3 27 12·733	+ 31	
		+ 2 39·364	+ 9 32 12	
ix. P L′	=	180 23 12·850	May 30 21 32 12	

		° ′ ″	h. m. s.	
x. N L.	Epoch	7 0 14·957	April 29 12 0 0	A.D. 1801
3320 y.		+134 18 36·998		− 3320
		141 18 51·955		
Corr. 33·2 C.		− 1 53 20·578		
		139 25 31·377	April 29 12 0 0	B.C. 1520
		− 1 38 29·731	+ 31	
		− 1 15·751	+ 9 32 12	
xi. N L′	=	137 45 45·895	May 30 21 32 12	

	° ′ ″	s. ° ′	
xii. SA = SL′ − AL′ =	11 51 25·952	= 0 11 51·432 5	
xiii. MA = ML′ − PL′ =	54 3 58·617	= 1 24 3 58·617	From Per.
		= 7 24 3 58·617	From Ap.
xiv. ND = SL′ − NL′ =	276 41 25·572	= 9 6 41·426 2	

			h. m. s.
xv. E E′ E″ E‴.	E	Argt. SA	= −0 50 28
	E′	Argt. MA′ = MA − x	= −7 32 1·4
	E″	Argt. SA − MA′	= − 3 9·56
	E‴	Argt. N D	= − 21·07
	E E′ E″ E‴		= −8 26 0·03

		h. m. s.	
xvi. M T.‴ MT′	=	May 30 21 32 12	
E E′ E″ E‴	=	− 8 26 0·03	
MT″	=	May 30 13 6 11·97	Mean time of true opposition at Greenwich.
MT‴	=	May 30 15 26 58·97	At Jerusalem.

The result of this calculation therefore is,

		h.	m.	s.	
Mean full moon	May 30	21	32	12	mean time at Greenwich.
	May 30	23	52	59	mean time at Jerusalem.
True full moon	May 30	13	6	11·97	mean time at Greenwich.
	May 30	15	26	58·97	mean time at Jerusalem.

We shall next calculate the date of the full moon immediately after the first miracle.

ii. Calculation of the full moon of June, B. C. 1520, for the meridian of the ancient Jerusalem. Second year of the cycle of leap-year. Epoch, April 29 at 12 h. A. D. 1801. Interval, 3320 mean Julian years. Secular correction, 33·2 centuries. Mean V. E. B. C. 4004 to mean V. E. B. C. 1520, 2484 mean tropical years.

		h. m. s.	
i. S L.	April 5	15 37 46·6	Mean V. E. at Greenwich B. C. 1520.
	+ 84	20 22 13·4	
	June 29	12 0 0·0	

		° ′ ″	h. m. s.
S L	=	0 0 0·0	April 5 15 37 46.6
		+ 83 37 51·414 943	+ 84 20 22 13·4
S L	=	83 37 51·415	June 29 12

			° ′ ″	
ii.	M L	=	229 13 2·824	May 30 12 h. Cal. i.
			+ 35 17 30·810	+ 30
	M L	=	264 30 33·634	June 29 12
iii. S L′. iv. M L′.	S L + 180°	=	− 263 37 51·415	
	D	=	0 52 42·219	June 29 12

		° ′ ″			h. m. s.
D′ D″ D‴ D⁗	=	− 0 4 15·661	T′ T″ T‴ T⁗	=	0 7 45·670
D	=	0 52 42·219	T	=	1 35 59·787
D D′ D″ D‴ D⁗	=	0 56 57·880	T T′ T″ T‴ T⁗	=	− 1 43 45·457

		° ′ ″			h. m. s.
S L	=	83 37 51·415	v. M T	=	June 29 12 0 0
D′ D″ D‴ D⁗	=	− 4 15·661	T T′ T″ T‴ T⁗		− 1 43 45
S L′	=	83 33 35·754	vi. M T′	=	June 29 10 16 15
S L′ + 180 = M L′	=	263 33 35·754			June 29 10 16 15

			° ′ ″	h. m. s.	
vii.	A L	=	42 35 36·179	April 5 15 37 46·6	Cal. i.
viii.	A L′	=	42 35 50·505	June 29 10 7 46·6	

			° ′ ″	h. m. s.	
viii.	P L	=	180 20 33·486	May 30 12 0 0	Cal. i.
ix.	P L′	=	183 40 36·267	June 29 10 16 15	

x.	N L	=	137° 47′ 1″·646	May 30 12h 0m 0s		Cal. i.
xi.	N L′	=	136 11 56·287	June 29 10 16 15		
xii.	S A	=	40° 57′ 45″·249	=	1s 10° 57′·754	
xiii.	M A	=	79° 52′ 59″·487	=	2s 19° 52′ 59″·487	From P.
					8 19 52 59·487	From Ap.
xiv.	N D	=	307° 21′ 39″.467	=	10s 7° 21′·658	

xv.	E	Argt. S A	=	− 2h 41m 54s·6
	E′	Argt. M A′ = M A − x	=	− 9 29 10·6
	E″	Argt. S A—M A′	=	− 2 53·6
	E‴	Argt. N D	=	− 1 29·6
	E E′ E″ E‴		=	−12 15 28·4

xvi.	M T′	=	June 29 10h 16m 15s	
	E E′ E″ E‴	=	− 12 15 28·4	
	M T″	=	June 28 22 0 46·6	Mean time at Greenwich.
	M T‴	=	June 29 0 21 33·6	Mean time at Jerusalem.

The result of this calculation consequently is

Mean full moon	June 29 10h 16m 15s	Mean time at Greenwich.
	June 29 12 37 2	Mean time at Jerusalem.
True full moon	June 28 22 0 46·6	Mean time at Greenwich.
	June 29 0 21 33·6	Mean time at Jerusalem.

In the next place we will calculate the true mean standard of the natural lunar synodic revolution at this particular epoch of May 31 B. C. 1520, from the formula of which we have hitherto made use for such purposes [e].

iii. Calculation of the mean lunar standard B. C. 1520.

$\kappa = 33{\cdot}2$ centuries, $\kappa^2 = 1102{\cdot}24$.

$+ 0^s{\cdot}034\,136 \times \kappa$		=	$+ 1^s{\cdot}133\,315\,2$
$- 0{\cdot}000\,092\,45 \times \kappa^2$			$- 0{\cdot}101\,902\,1$
Correction,	33·2 C	=	+ 1·031 413 1
Standard of A. D. 1801,	..	..	29d 12h 44m 2s·865 537 6
Correction	33·2 C	=	+ 1·031 413 1
Standard of B. C. 1520.		=	29 12 44 3·896 950 7

e ii. 25. Diss. ix. ch. i. sect. vii: iv. 502. Diss. xv. ch. ix. sect. ii: 524. 389. Diss. xviii. ch. ii. sect. iv. Cf. iii. sect. vii: 541. sect. ix.

		h.	m.	s.
Now we had by calc. i. mean full moon,	May 30	21	32	11·650
One mean lunation of the standard of B.C. 1520.	+ 29	12	44	3·897
Mean full moon from the standard,	June 29	10	16	15·547
From calculation ii	June 29	10	16	14·543
				− 1·004

It is manifest then that these two mean full moons stood as nearly as possible at the distance of one mean lunar month of the standard of this period, (such as we recover from formula,) one from the other; but at no greater. Consequently natural mean lunar time must have proceeded apparently from one to the other agreeably to its natural law at this time, notwithstanding the intervention between them of so extraordinary an event as the solstice of Joshua.

We shall next proceed to calculate the new moon before and after the date of the second miracle; that is, before and after May 31 B.C. 710. But as there were two new moons in the month of May this year, it may not be amiss to calculate both.

iv. Calculation of the first new moon in May B.C. 710, for the meridian of the ancient Jerusalem. Fourth year of the cycle of leap-year. Epoch, April 29 at 12 h. A.D. 1803. Interval, 2512 mean Julian years. Secular Correction, 25·1 centuries. Mean V.E. B.C. 4004 to mean V.E .B.C. 710, 3294 mean tropical years.

			h.	m.	s.	
i.	S L	March 30	20	58	10·6	Mean. V. E. Greenwich B. C. 710.
		+ 31	15	1	49·4	
		May 1	12	0	0·0	

		°	′	″		h.	m.	s.
S L	=	0	0	0·0	Mar. 30	20	58	10·6
		+ 31	10	20·426 324	+ 31	15	1	49·4
S L	=	31	10	20·426	May 31	12		

			°	′	″		h.	m.	s.	
ii.	ML	Epoch	289	59	11·523	April 29	12	0	0	A. D. 1803.
		− 2512 y.	− 289	5	56·386					
			0	53	15·137					− 2512.
		Corr. 25·1 C	+ 1	47	29·563					
	M L	=	2	40	44·700	April 29	12	0	0	B. C. 710.
	M L	=	29	1	54·754	May 1	12			

			°	′	″		
iii. M L′	S L	=	31	10	20·426		
iv. S L′	− M L	=	− 29	1	54·754		
	D	=	+ 2	8	25·672	May 1	12

		° ′ ″			h. m. s.
D′ D″ D‴ D⁗ D′⁗	=	+ 0 10 23·017	T T′ T″ T‴ T⁗ T′⁗	=	+ 0 18 54·787
D	=	+ 2 8 25·672	T	=	+ 3 53 55·412
D D′ D″ D‴ D⁗ D′⁗	=	+ 2 18 48·689	T T′ T″ T‴ T⁗ T′⁗	=	+ 4 12 50·199

		° ′ ″			h. m. s.
S L	=	31 10 20·426	v. M T	=	May 1 12 0 0
D′ D″ D‴ D⁗ D′⁗	=	+ 10 23·017	T T′ T″ T‴ T⁗ T′⁗		+ 4 12 50
S L′ = M L′	=	31 20 43·443	vi. M T′	=	May 1 16 12 50

			° ′ ″		h. m. s.	
vii.	A L, 3294 y.	=	56 28 57·108	March 30	20 58 10·6	
	A L′	=	56 29 2·480	May 1	15 58 10·6	
viii.	P L Epoch		1 58 35·570	April 29	12	A. D. 1803.
	− 2512 y.		− 334 26 33·012			— 2512.
			27 32 2·558			
	Corr. 25·1 C	=	− 6 37 46·161			
	P L	=	20 54 16·397	April 29	12 0 0	B. C. 710.
ix.	P L′	=	21 8 48·926	May 1	16 12 50	
x.	N L Epoch		328 20 50·327	April 29	12 0 0	A. D. 1803
	− 2512 y.		+ 346 14 57·198			− 2512
			314 35 47·525			
	Corr. 25·1 C	=	− 1 5 47·495			
	N L	=	313 30 0·030	April 29	12 0 0	B. C. 710
xi.	N L′	=	313 23 5·285	May 1	16 12 50	

			° ′ ″		s ° ′	
xii.	S A	=	334 51 40·963	=	11 4 51·6827	
xiii.	M A	=	10 11 54·517	=	0 10 11 54·517	From P.
					6 10 11 54·517	From Ap.
xiv.	N D	=	77 57 38·158	=	2 17 57·6359	

				h. m. s.
xv.	E	Arg. S A	=	+ 1 44 33·3
	E′	Arg. M A′ = M A + x	=	− 1 42 55·65
	E″	Arg. S A − M A′	=	− 2 45·99
	E‴	Arg. N D	=	+ 37·16
	E E′ E″ E‴		=	− 0 0 31·18

			h. m. s.	
xvi.	M T′	=	May 1 16 12 50	
	E E′ E″ E‴	=	− 0 31·18	
	M T″	=	May 1 16 12 18·82	Mean time at Greenwich.
	M T‴	=	May 1 18 33 5·82	Mean time at Jerusalem.

The result of this calculation is

		h. m. s.	
Mean new moon	May 1	16 12 50·199	Mean time at Greenwich.
	May 1	18 33 37·199	Mean time at Jerusalem.
True new moon	May 1	16 12 18·82	Mean time at Greenwich.
	May 1	18 33 5·82	Mean time at Jerusalem.

v. Calculation of the second new moon in May B.C. 710, for the meridian of the ancient Jerusalem. Fourth year of the cycle of leap-year. Epoch, April 29 at 12 h. A.D. 1803. Interval, 2512 mean Julian years. Secular Correction, 25·1 centuries. Mean V. E. B.C. 4004 to mean V. E. B.C. 710, 3294 mean tropical years.

At Greenwich.

		° ′ ″		h. m. s.	
i.	SL =	0 0 0·0	March 30	20 58 10·6	B.C. 710
	+	60 44 30·324	+	61 15 1 49·4	
	SL =	60 44 30·324	May 31	12 0 0	
ii.	M L =	2 40 44·700	April 29	12	B.C. 710. Cal. iv.
	+	61 38 40·864	+	32	
	M L =	64 19 25·564	May 31	12	
iii. SL′ / iv. ML′	} −SL =	−60 44 30·324			
	D =	− 3 34 55·240	May 31	12	

	° ″ ′		h. m. s.
D′ =	0 16 4·615	T′ =	0 29 16·987
D″ =	1 12·157	T″ =	2 11·429
D‴ =	5·397	T‴ =	9·830
D⁗ =	0·403	T⁗ =	0·734
D′ D″ D‴ D⁗ =	−0 17 22·572	T′ T″ T‴ T⁗ =	0 31 38·980
D =	3 34 55·240	T =	6 31 27·890
D D′ D″ D‴ D⁗ =	3 52 17·812	T T′ T″ T‴ T⁗ =	− 7 3 6·870

	° ′ ″		h. m. s.
SL =	60 44 30·324	v. MT =	May 31 12 0 0
D′ D″ D‴ D⁗ =	− 17 22·572	T T′ T″ T‴ T⁗ =	− 7 3 7
SL′ = ML′ =	60 27 7·752	vi. MT′ =	May 31 4 56 53

		° ′ ″	h. m. s.	
vii.	AL, 3294ʸ =	56 28 57·108	Mar. 30 20 58 10·6	Cal. iv.
	AL′ =	56 29 7·474	May 31 4 58 10·6	
viii.	PL. =	20 54 16·397	April 29 12 0 0	B.C. 710. Cal. iv.
ix.	PL′ =	24 26 12·343	May 31 4 56 53	

		° ′′ ′		h. m. s.	
x.	NL	=313 30 0·030	April 29	12 0 0	B.C. 710. Cal. iv.
xi.	NL′	=311 49 15·677	May 31	4 56 53	

		° ′ ′′		s ° ′	
xii.	SA	= 3 58 0·278	=	0 3 58·004 6	
		° ′ ′′		s ° ′	
xiii.	MA	= 36 0 55·409	=	1 6 0 55·409	From P.
			=	7 6 0 55·409	From Ap.
		° ′ ′′		s ° ′	
xiv.	ND	=108 37 52·075	=	3 18 37·867 9	

				h. m. s.
xv.	E	Argt. SA	=	− 0 16 59·3
	E′	Argt. MA′=MA−x	=	− 5 23 24·7
	E′′	Argt. SA−MA′	=	− 2 29·8
	E′′′	Argt. ND	=	− 58·9
	E E′ E′′ E′′′		=	− 5 43 52·7

		h. m. s.	
xvi.	MT′	= May 31 4 56 53	
	E E′ E′′ E′′′	= − 5 43 52·7	
	MT′′	= May 30 23 13 0·3	Mean time at Greenwich.
	MT′′′	= May 31 1 33 47·3	Mean time at Jerusalem.

The result of this calculation consequently is

		h. m. s.	
Mean new moon	May 31	4 56 53·130	Mean time at Greenwich.
	May 31	7 17 40·130	Mean time at Jerusalem.
True new moon	May 30	23 13 0·3	Mean time at Greenwich.
	May 31	1 33 47·3	Mean time at Jerusalem.

vi. Calculation of the New Moon of June B.C. 710, for the meridian of the ancient Jerusalem. Fourth year of the cycle of Leap-year. Epoch, April 29 at 12 h. A.D. 1803. Interval, 2512 mean Julian years. Secular Correction, 25·1 centuries. Mean V. E. B.C. 4004 to mean V. E. B. C. 710, 3294 mean tropical years.

At Greenwich.

		° ′ ′′	h. m. s.	
i.	SL =	0 0 0·0	Mar. 30 20 58 10·6	B. C. 710
		+89 19 31·891	+ 90 15 1 49·4	
	SL =	89 19 31·891	June 29 12	

		° ′ ′′	h.	
ii.	ML =	2 40 44·700	April 29 12	B. C. 710. Cal. iv.
	ML =	86 26 21·347	June 29 12	

			° ′ ′′	
iii.	SL′ }	SL =	89 19 31·891	
iv.	ML′ }	−ML =	−86 26 21·347	
		D =	+ 2 53 10·544	June 29 12

	° ′ ″		h. m. s.
D′D″D‴D⁗D′′′′′ = +	0 14 0·093	T′T″T‴T⁗T′′′′′ =	0 25 30·175
D =	2 53 10·544	T =	5 15 25·740
D D′D″D‴D⁗D′′′′′ =	3 7 10·637	T T′T″T‴T⁗T′′′′′ =	+5 40 55·915

	° ′ ″		h. m. s.
SL =	89 19 31·891	v. MT = June 29	12 0 0
D′D″D‴D⁗D′′′′′ = +	14 0·093	T T′T″T‴T⁗T′′′′′ =	+5 40 56
SL′ = ML′ =	89 33 31·984	vi. MTᵛ = June 29	17 40 56

		° ′ ″		h. m. s.	
vii.	AL =	56 28 57·108	Mar. 30	20 58 10·6.	Cal. iv.
	AL′ =	56 29 12·466	June 29	17 58 10·6	
viii.	PL =	20 54 16·397	April 29	12h	B. C. 710. Cal. iv.
ix.	PL′ =	27 43 35·760	June 29	17h 40m 56″	
x.	NL =	313 30 0·030	April 29	12h	B. C. 710. Cal. iv.
xi.	NL′ =	310 15 26·070	June 29	17h. 40m. 56s.	
xii.	SA =	33 4 19·518	=	1s 3° 4′·3253	
xiii.	MA = +	61 49 56·224	=	2s 1° 49′ 56″·224	From P.
			=	8 1 49 56·224	From Ap.
xiv.	ND =	139 18 5·914 =		4s 19° 18′·098 56	

xv.			h. m. s.
	E Argt. SA	=	− 2 14 29·72
	E′ Argt. MA′ = MA − x =		− 8 14 27·16
	E″ Argt. SA − MA′	=	− 2 12·65
	E‴ Argt. ND	=	− 1 32·7
	E E E″ E‴	=	−10 32 42·23

		h. m. s.	
xvi.	MTᵛ = June 29	17 40 56	
	E E′ E″ E‴ = —	10 32 42·23	
	MT^{vi} = June 29	7 8 13·77	Mean time at Greenwich.
	MT^{vii} = June 29	9 29 0·77	Mean time at Jerusalem.

The result therefore of this calculation also is,

		h. m. s.	
Mean new moon,	June 29	17 40 55·915	Mean time at Greenwich.
	June 29	20 1 42·915	Mean time at Jerusalem.
True new moon,	June 29	7 8 13·77	Mean time at Greenwich.
	June 29	9 29 0·77	Mean time at Jerusalem.

Next we will calculate now too the true mean standard of the lunar synodic month for this period of B. C. 710.

vii. Calculation of the mean lunar standard B. C. 710. $\kappa = 25.1$ centuries. $\kappa^2 = 630.01$.

s. + 0·034 136 × κ	=	s. + 0·856 813 6
− 0·000 092 45 × κ²	=	− 0·058 244 4
Correction, 25·1 C	=	+ 0·798 569 2

		d.	h.	m.	s.
Standard of A. D. 1801,		29	12	44	2·865 537 6
Correction, 25·1 C	=				+ 0·798 569 2
Standard of B. C. 710	=	29	12	44	3·664 106 8
Two lunations of this standard,	=	59	1	28	7·328 213 6

			h.	m.	s.
Cal. iv. Mean new moon,	May	1	16	12	50·199
Two lunations of the standard of B. C. 710,	+	59	1	28	7·328
Third mean lunation of the standard,	June	29	17	40	57·527
Cal. vi. True mean new moon,	June	29	17	40	55·915
					− 1·612

			h.	m.	s.
Cal. v. Mean new moon,	May	31	4	56	53·130
One lunation of the standard,	+	29	12	44	3·664
Second mean lunation of the standard,	June	29	17	40	56·794
Cal. vi. True mean new moon,	June	29	17	40	55·915
					− 0·879

From these calculations then it must be inferred that mean lunar time of the standard of the period went on apparently without interruption from the last mean new moon before the second miracle to the next mean new moon after it. We will endeavour to shew also that true mean lunar time must have gone on apparently in like manner, without any the least interruption, from the mean full moon last before the first miracle to the mean new moon last before the second; and from the mean full moon next after the first miracle to the mean new moon next after the second.

viii. From May 31 B. C. 1520 to May 31 B. C. 710 there were 810 mean Julian years, and 810 actual; the latter of which contained 18 hours of mean solar time less than the former.

		d.	h.
800 mean Julian years[e]	=	292 200	0
10	=	3 652	12
810	=	295 852	12
Add from the last leap-year, B. C. 1521 − B. C. 1520			6
In mean Julian time,		295 852	18
In actual		295 852	0

[e] Supplementary Tables, xxxi.

In these 810 actual Julian years there would be 10 018 mean or actual lunar months.

	yrs.		
304 × 2 years =	608	=	3760 × 2 = 7520 lunations.
	190	=	2350
	8	=	99
	4	=	49
	810	=	10 018

So that from the full moon May 31 B. C. 1520 to the new moon May 31 B. C. 710 there would be 10 018½ mean lunar months. The sum of mean time contained in these with the standard of our Fasti would be as follows[f]:

		d.	h.	m.	s.	t.
10 000 lunations	=	295 305	20	25	31	54·894
10	=	295	7	20	25	31·915
8	=	236	5	52	20	25·532
½	=	14	18	22	1	16·596
10 018½	=	295 852	4	0	19	8·937
810 Julian years B. C. 1520, – B. C. 710	—	295 852				
Excess of 10 018½ lunations over these 810 Julian years.	=		4	0	19	8·937
			4	0	19·149	

We have then, Cal. i.		h.	m.	s.	
The mean full moon,	May 30	21	32	12	B. C. 1520.
Add	+	4	0	19·149	
10 018th mean new moon of the standard of the Fasti	May 31	1	32	31·149	B. C. 710.

The date of this mean new moon of the standard of the Fasti however B. C. 710 would not represent that of the true, at the same point of time. To arrive at that by the same or a similar process we must first calculate the standard of the middle period between B. C. 1520 and B. C. 710; which is B. C. 1115, 405 years distant from both.

ix. Calculation of the mean lunar standard B. C. 1115. $\kappa = 29.15$ centuries. $\kappa^2 = 849{\cdot}7225$.

s.		s.
+ 0·034 136 × κ	=	+ 0·995 064 4
− 0·000 092 45 × κ²	=	− 0·078 556 8
Correction, 29·15 C.		+ 0·916 507 6

	d.	h.	m.	s.
Standard of A. D. 1801,	29	12	44	2·865 537 6
Correction, 29·15 C =				+ 0·916 507 6
Standard of B. C. 1115,	29	12	44	3·782 045 2
Standard of the Fasti,	29	12	44	2·553 191
Excess of the former on the latter,				1·228 854

[f] Supplementary Tables, xxv.

This difference in one lunation being multiplied by 10 018·5 lunations = 12 311·273 799 sec. = 3h. 25m. 11·274 sec. And this is the amount of mean time by which the 10 018·5th lunation of the standard of the Fasti B. C. 710 would anticipate on the same with the standard of B. C. 1115. We have then the date of the former,

		h.	m.	s.
	May 31	1	32	31·149
Add		3	25	11·274
We get that of the latter,	May 31	4	57	42·423
True mean new moon, Cal. v.	May 31	4	56	53·130
			−	49·293

		h.	m.	s.	
In like manner, Cal. ii. we had the mean full moon,	June 29	10	16	15	B. C. 1520.
	+	4	0	19·149	
10 018th mean new moon of the standard of the Fasti	June 29	14	16	34·149	B. C. 710.
Anticipation on the standard of the middle period,		3	25	11·274	
10 018th of the middle standard,	June 29	17	41	45·423	
True mean new moon, Cal. vi.	June 29	17	40	55·915	
			−	49·508	

These coincidences must satisfy us of the exactness of our formulæ, and of the accuracy of our calculations hitherto. They appear to be decisive of the fact that true mean lunar time went on uniformly not merely from the mean full moon May 30 to the mean full moon June 29 B. C. 1520, but also from the mean full moon May 30 B. C. 1520 to the mean new moon May 31 B. C. 710; and not only from the mean new moon May 31 to the mean new moon June 29 B. C. 710, but also from the mean full moon June 29 B. C. 1520 to the mean new moon June 29 B. C. 710.

We shall now proceed to calculate the true place of the moon May 31 at 6h. B. C. 1520; and its true place May 31 at 18h. B. C. 710: each by means of the same Tables of which we made use, and after the same manner in which we proceeded, on an occasion of the same kind before[g].

x. Calculation of the true place of the moon in the ecliptic May 31 at 6 hours mean time, for the meridian of the ancient Jerusalem, B. C. 1520. Second year of the cycle of leap-year. Epoch, April 29 at 12h. A. D. 1801. Interval, 3320 mean Julian years. Se-

g iii. 543. Diss. xv. ch. ix. sect. x.

cular Correction, 33·2 centuries. Mean V. E. B. C. 4004 to mean V. E. B. C. 1520, 2484 mean tropical years.

		h.	m.	s.	
Tab. mean V. E.	April 5	17	47	24·0	B. C. 1520.
Correction		+	11	9·6	
True mean V. E.	April 5	17	58	33·6	
	+ 55	12	1	26·4	
	May 31	6	0	0·0	

		° ′ ″		h. m. s.
S L	=	0 0 0·0		April 5 17 58 33·6
		+ 54 42 15·858		+ 55 12 1 26·4
S L	=	54 42 15·858		May 31 6
– AL, (2484 y. 55 d. 12 h.)		42 35 45·558		May 31 5 58 33·6
S A	=	12 6 30·300	=	s. ° ′ 0 12 6·505 Fr. Ap.
				6 12 6·505 Fr. Per.
Eq. of the centre, or E.	=	– ° ′ ″ 0 22 33·3		
S L	=	° ′ ″ 54 42 15·858		May 31 6 h.
E	=	– 0 22 33·3		
S L′	=	54 19 42·558		May 31 6 h.

		° ′ ″	h. m. s.
M L, Epoch		31 13 1·811	April 29 12 0 0 A.D. 1801.
– 3320 y.		– 213 33 15·860	– 3320.
		177 39 45·951	
Corr. 33·2 C.	=	+ 3 5 11·036	
		180 44 56·987	April 29 12 0 0 B.C. 1520.
		+ 61 38 40·864	+ 32.
		242 23 37·851	May 31 12 0 0 at Gr.
			= May 31 14 20 47 at Jer.
		– 4 34 56·299	– 8 20 47
M L	=	237 48 41·552	May 31 6 h. at Jerusalem.

		° ′ ″	
P L, Epoch,		280 39 4·766	April 29 12 h. A. D. 1801.
– 3320 y.		– 92 20 11·146	– 3320.
		188 18 53·620	
Corr. 33·2 C.	=	– 11 25 32·867	
P L	=	176 53 20·753	April 29 12 h, B. C. 1520.

		° ′ ″		h. m. s.
P L	=	176 53 20·753		April 29 12 0 0 B.C. 1520.
		+ 3 33 53·789		+ 32
P L	=	180 27 14·542		May 31 12 0 0 at Gr.
			=	May 31 14 20 47 at Jer.
		− 2 19·473		− 8 20 47
P L	=	180 24 55·069		May 31 6 0 0 at Jer.
From Apogee,	=	0 24 55·069		

		° ′ ″		h. m. s.
N L, Epoch,		7 0 14·957		April 29 12 0 0 A.D. 1801.
− 3320y.	=	+ 134 18 36·998		− 3320
		141 18 51·955		
Corr. 33·2 C.		− 1 53 20·578		
N L	=	139 25 31·377		April 29 12 0 0 B.C. 1520.
		− 1 41 40·367		+ 32
N L	=	137 43 51·010		May 31 12 0 0 at Gr.
			=	May 31 14 20 47 at Jer.
		+ 1 6·297		− 8 20 47
N L	=	137 44 57·307		May 31 6 h. at Jerusalem.

		° ′ ″		s. ° ′
S A	=	12 6 30·300	=	0 12 6·505

		° ′ ″		
M L	=	237 48 41·552		
− P L	=	− 180 24 55·069		
				s. ° ′ ″
M A	=	57 23 46·483	=	1 27 23 46·483 Fr. P.
			=	7 27 23 46·483 Fr. A.

		° ′ ″	
M L	=	237 48 41·552	
− S L′		− 54 19 42·558	
		183 28 58·994	Mean D. of ☽ from ☉
		6 57 57·988	2 D. of ☽ from ☉
		s ° ′ ″	
	=	0 6 57 57·988	

ARGUMENTS OF THE x EQUATIONS.

			s ° ′ ″		s ° ′
Argt. of i. Eq.	SA	=	0 12 6 30·300	=	0 12 6·505

	s.	°	′	″		s.	°	′
2 D of ☽ fr. ☉.	0	6	57	57·988				
+ SA +	0	12	6	30·300				
Argt. ii. Eq.	0	19	4	28·288	=	0	19	4·471 46

	s.	°	′	″		s.	°	′
2 D of ☽ fr. ☉.	0	6	57	57·988				
− SA −	0	12	6	30·300				
Argt. iii. Eq.	11	24	51	27·688	=	11	24	51·461 46

	s.	°	′	″		s.	°	′
2 D of ☽ fr. ☉.	0	6	57	57·988				
+ MA. +	7	27	23	46·483				
Arg. iv. Eq.	8	4	21	44·471	=	8	4	21·741 18

	s.	°	′	″		s.	°	′
2 D of ☽ fr. ☉	0	6	57	57·988				
− MA. −	7	27	23	46·483				
Argt. v. Eq. The Evection.	4	9	34	11·505	=	4	9	34·191 75

	s.	°	′	″		s.	°	′
Argt. v. Eq. ..	4	9	34	11·505				
+ SA +	0	12	6	30·300				
Arg. vi. Eq. ..	4	21	40	41·805	=	4	21	40·696 75

	s.	°	′	″		s.	°	′
Arg. v. Eq. ..	4	9	34	11·505				
− SA −	0	12	6	30·300				
Arg. vii. Eq. ..	3	27	27	41·205	=	3	27	27·686 75

	s.	°	′	″		s.	°	′
MA =	7	27	23	46·483				
− SA −	0	12	6	30·300				
Arg. viii. Eq. ..	7	15	17	16·183	=	7	15	17·269 7

	s.	′	″		s.	°	′
NL =	137	44	57·307				
− SL′ −	54	19	42·558				
Arg. ix. Eq. ..	83	25	14·749	=	2	23	25·245 8

	°	′	″		s.	°	′
Long. of ☽ Ap. ..	0	24	55·069				
− SL′ −	54	19	42·558				
Arg. x. Eq. ..	306	5	12·511	=	10	6	5·208 5

SUM OF THE x EQUATIONS.

Negative.	°	′	″	*Positive.*	°	′	″
ii	0	0	18	i	0	2	20·193
iv	0	0	49	iii	0	0	6·142
v	1	2	39·797	vi		1	19·643
				vii		0	43·539
viii		0	24	ix			13·158
				x			43·087

Sum of Negative	−1	4	10·797	Sum of Positive	5	25·762
	+	5	25·762			
Sum of x Equations −		58	45·035			

		s.	°	′	″	
MA	=	7	27	23	46.483	
Correction ..		+		4	49·602	Arg. SA. Precept 5. P. 123.
x Equations		−		58	45·035	
Argt. xi Eq. MA′ / Eq. of the centre	=	7	26	29	51·050	= 7s. 26° 29′·8508

		°	′	″	
ML	=	237	48	41·552	May 31 6 A.M.
i. Cor. x Eqns.	−		58	45·035	
ii. Cor. xi. Eq. / Equation of the centre	+	5	27	26·488	
ML″	=	242	17	23·005	ML twice corrected
− SL′	=	−54	19	42·558	Sun's true longitude, May 31 6 A.M.
Argt. xii Eq. The Variation,		187	57	40·447	= 6s. 7° 57′·6741

		°	′	″	
ML″	=	242	17	23·005	ML twice corrected
xii Eq.		+	10	10·093	
ML‴	=	242	27	33·098	ML thrice corrected
	=	8s. 2°	27′	·5516	

		s.	°	′	″	
NL	=	4	17	44	57·307	
Correction			+	1	49·976	Argt. SA. Precept 5 P. 123
NL′	=	4	17	46	47·283	Equated long. of Node.
ML‴	=	8	2	27	33·098	ML thrice corrected
− NL′	−	4	17	46	47·283	
		3	14	40	45·815	Equated D of ☽ from ☊
		6	29	21	31·630	Twice Eq. D of ☽ from ☊ Precept 7. P. 123
− MA′ = −		7	26	29	51·050	Argt. xi Eq.
Argt. xiii Eq.		11	2	51	40·580	= 11s. 2° 51′·6763

		° ′ ″	
ML‴	=	242 27 33·098	
xiii Eq.		− 38·139	
ML⁗	=	242 26 54·959	M L four times corrected, Longitude of ☽ in its orbit.
− NL′	− =	137 46 47·283	Equated Longitude of Node Precept 8. P. 123.

Argt. xiv Eq. The Reduction 104 40 7·676 = 3^s 14° 40′·127 9

		° ′ ″	
ML⁗	=	242 26 54·959	Longitude of ☽ in its orbit.
xiv Eq.		+ 3 17·694	
ML′′′′′	=	242 30 12·653	i Corr. of Long. of ☽ in its orbit.
xv Eq. Equa. of Equinoxes		− 12·075	Argt. NL. Precept 9. P. 124.
ML′′′′′′	=	242 30 0·578	ii Corr. of Long. of ☽ in its orbit. True Longitude of ☽ in the Ecliptic.

The result of this calculation consequently is,

	° ′ ″	
Mean Longitude, M L,	237 48 41·552	May 31 6 h. mean time.
True Longitude, M L′,	242 30 0·578	May 31 6 h. mean time.

xi. Calculation of the true place of the moon in the ecliptic May 31 at 18 hours mean time for the meridian of the ancient Jerusalem, B. C. 710. Fourth year of the cycle of leap-year. Epoch, April 29 at 12 h. A. D. 1803. Interval, 2512 mean Julian years. Secular Correction, 25·1 centuries. Mean V. E. B. C. 4004 to mean V. E. B. C. 710, 3294 mean tropical years.

	h. m. s.	
Tab. mean V. E.	March 30 11 7 48·0	B. C. 710
Correction	+ 12 11 9·6	
True mean V. E.	March 30 23 18 57·6	at Jerusalem.
	+ 61 18 41 2·4	
	May 31 18 0 0·0	

	° ′ ″	h. m. s.
S L =	0 0 0·0	March 30 23 18 57·6
	+ 60 53 30·499	+ 61 18 41 2·4
S L =	60 53 30·499	May 31 18 0 0·0
A L, 3294 yrs. + 61 d. 18 h. 30 m.	−56 29 7·547	May 31 17 48 57·6

S A = 4 24 22·952 = { 0^s 4° 24′·382 5 Fr. Ap. / 6 4 24·382 5 Fr. Per. }

Equation of the centre, E. −0^s 8° 54″·2

	° ′ ″		
S L =	60 53 30·499		May 31 18 h.
E =	− 8 54·2		
S L′ =	60 44 36·299		{ May 31 at 18h. Sun's true longitude.
	° ′ ″		h. m. s.
M L. Epoch	289 59 11·523		April 29 12 0 0 A.D. 1803
− 2512 y.	−289 5 56·386		− 2512
	0 53 15·137		
Corr. 25·1 C	+ 1 47 29·563		
	2 40 44·700		April 29 12 0·0 B.C. 710
	+61 38 40·864		+ 32
	64 19 25·564		May 31 12 0·0 at Gr.
		=	May 31 14 20·47 at Jer.
	+ 2 0 21·214		+ 3 39·13
M L =	66 19 46·778		May 31 18 0 0 at Jer.
	° ′ ″		h. m. s.
P L. Epoch	1 58 35·570		April 29 12 0 0 A. D. 1803
− 2512 y.	−334 26 33·012		— 2512
P L	27 32 2·558		April 29 12 0 0 B. C. 710
Corr. 25·1 C	−6 37 46·161		
	20 54 16·397		April 29 22 0 0
	+3 33 53·789		+ 32
			h. m. s.
	24 28 10·186		May 31 12 0 0 at Gr.
		=	May 31 14 20 47 at Jer.
	+ 1 1·054		+ 3 39 13
P L =	24 29 11·240		May 31 18 0 0 at Jer.
Long. of Apogee =	204 29 11·240		
	° ′ ″		h. m. s.
N L Epoch	328 20 50·327		April 29 12 0 0 A. D. 1803
− 2512 y.	+346 14 57·198		— 2512
	314 35 47·525		
Corr. 25·1 C	−1 5 47·495		
	313 30 0·030		April 29 12 0 0 B. C. 710
	−1 41 40·367		+ 32
			h. m. s.
	311 48 19·663		May 31 12 0 0 at Gr.
		=	May 31 14 20 47 at Jer.
	− 29·022		+ 3 39 13
N L =	311 47 50·641		May 31 18 0 0 at Jer.
	° ′ ″		s. ° ′
S A =	4 24 22·952	−	0 4 24·3825

M A =	41° 50′ 35″·538	From Per.	
=	221 50 35·538	Fr. Ap. =	7s 11° 50′·5923
M L =	66° 19′ 46″·778	May 31 18	
− S L′ =	−60 44 36·299	May 31 18	
	5 35 10·479	Mean D of ☽ fr. ☉	
	11° 10′ 20″·958	Twice mean D of ☽ from ☉	

ARGUMENTS OF THE X EQUATIONS.

Argt. i. Eq. S A =	4° 24′ 22″.952	=	0s 4° 24′·3825
2 D of ☽ fr. ☉	11° 10′ 20″·958		
+ S A	+ 4 24 22.952		
Argt. ii. Eq.	15 34 43·910	=	0s 15 34′·7318
2 D of ☽ fr. ☉	11° 10′ 20″·958		
− S A	− 4 24 22·952		
Argt. iii. Eq.	6 45 58·006	=	0s 6° 45′·96676
2 D of ☽ fr. ☉	11° 10′ 20″·958		
+ M A	+ 221 50 35·538		
Argt. iv. Eq.	233 0 56·496	=	7s 23° 0′·9416
2 D of ☽ fr. ☉	11° 10′ 20″·958		
− M A	− 221 50 35·538		
Argt. v. Eq. The Evection	149 19 45·420	=	4s 29° 19′·757
Argt. v. Eq.	149° 19′ 45″·420		
+ S A	+ 4 24 22·952		
Argt. vi. Eq.	153 44 8·372	=	5s 3° 44′·1395
Argt. v. Eq.	149° 19′ 45″·420		
− S A	− 4 24 22·952		
Argt. vii. Eq.	144 55 22·468	=	4s 24° 55′·3744
M A	221° 50′ 35″·538		
− S A	− 4 24 22·952		
Argt. viii. Eq.	217 26 12·586	=	7s 7° 26′·2097

	° ′ ″	
N L =	311 47 50·641	
− S L′	− 60 44 36·299	
	° ′ ″	s. ° ′
Argt. ix. Eq.	251 3 14·342	= 8 11 3·239

	° ′ ″	
Longitude of ☽ Ap.	204 29 11·240	May 31 18
− S L′	− 60 44 36·299	
	° ′ ″	° ′ ″
Argt. x. Eq.	143 44 34·941	= 4 23 44·582 35

Sum of the x Equations.

Negative.		*Positive.*	
	′ ″		′ ″
ii	0 14·579	i	0 51·470
iii	7·766		
iv	43·016		
v	41 35·962	vi	57·529
		vii	28·077
viii	20·437		
ix	35·892		
		x	1 5·257
	−43 37·652		+3 22·333
	+ 3 22·333		
Sum of x Equations	−40 15·319		

		° ′ ″	
M A	=	221 50 35·538	
Correction	=	+ 1 46·753	Argt. S A. Precept 5, P. 123
Sum of x Equations		−40 15·319	
M A′	=	221 12 6·972	Argt. xi Equation or Equation of the Centre
		s. ° ′	
	=	7 11 12·1162	

		° ′ ″	
M L	=	66 19 46·778	May 31 18 h.
Sum of x Equations	−	40 15·319	
Equation of the centre	+	4 22 34·177	
M L″		70 2 5·636	M L twice corrected.
− S L′		−60 44 36·299	Sun's true longitude May 31 18 h.
Argt. xii Eq. The Variation		9 17 29·337	= 0s. 9° 17′·488 95

		° ′ ″	
M L″	=	70 2 5·636	M L twice corrected.
xii Eq.	=	+ 11 12·112	
M L‴	=	70 13 17·748	M L thrice corrected.

		° ′ ″	
N L	=	311 47 50·641	May 21 18 h.
Correction		+ 0 40·657	Argt. S A. Precept 5, P. 123.
N L′	=	311 48 31·298	Equated Longitude of Node.

		° ′ ″	
M L‴	=	70 13 17·748	
− N L′		−311 48 31·298	
		118 24 46·450	Equated distance of moon from Node.
		236 49 32·900	Twice Eq. dist. of ☽ from Node.
− M A′ Argt. xi Eq.		−221 12 6·972	Precept 7, P. 123

			s. ° ′
Argt. xiii Eq.		15 37 25·928	= 0 15 37·432 13

		° ′ ″	
M L‴	=	70 13 17·748	
xiii Eq.	=	+ 0 22·248	
M L⁗	=	70 13 39·996	M L four times corrected or
− N L′		−311 48 31·298	Longitude of ☽ in its orbit.
Argt. xiv Eq.		118 25 8·698	= 3° 28′ 25″·144 96
The Reduction			

		° ′ ″	
M L⁗	=	70 13 39·996	Longitude of ☽ in its orbit.
xiv Eq.	=	+ 5 37·353	
M L′′′′′		70 19 17·349	i Corr. of long. of ☽ in its orbit.
xv Eq.	=	+ 0 13·44	Argt. N L, Precept 9, P. 124
M L′′′′′′		70 19 30·789	ii Corr. of long. of ☽ in its orbit. True longitude of the moon in the Ecliptic.

The result of this calculation also is,

	° ′ ″	
Mean Longitude, M L,	66 19 46·778	May 31 at 18 h. mean time.
True Longitude, M L′,	70 19 30·789	May 31 at 18 h. mean time.

We may shew the consistency of the first of these calculations with calculation i, as follows:

		h. m. s.	
Cal. i. True full moon,	May 30	15 26 58·97	at Jerusalem, B.C. 1520.
		+ 14 33 1·03	
	May 31	6 0 0·0	

	h. m. s.	° ′ ″
Supplementary Tables, Table xi. P. ii. iii. iv. ..	14 33 1·03	= 7 59 18·050640

We have then,

True mean opposition in mean longitude.	Calc. i.	True opposition in mean time.
° ′ ″		h. m. s.
M L = 234 27 11·467	M T′,	May 30 15 26 58·97
+ 7 59 18·051		+ 14 33 1·03
ML′ = 242 26 29·518	= M T,	May 31 6 0 0·0

True longitude.		True mean time.
° ′ ″		h. m. s.
M L = 242 30 0·578	.. ..	May 31 6 0 0
M L′ = 242 26 29·518		
3 31·060	= (Tab. xii. P. ii.)	6 24·433

This difference of M L and M L′, (the true longitude, and the longitude thus obtained for the same point of time May 31 at 6 h. mean time,) reduced to time and added to the sum of the Equations, E E′ E″ E‴, Calc. i. should be the amount of correction necessary to reduce the mean place May 31 6 A. M., to the true.

			h. m. s.
Now Calc. i.	E E′ E″ E‴	=	8 26 0·03
	Correction = x	=	6 24·433
	E E′ E″ E‴ + x	=	8 32 24·463

	° ′ ″
The true Longitude, May 31, at 6 h. Calc. x.	= 242 30 0·578
The mean	= 237 48 41·552
Diff.	= 4 41 19·026

Now, Table xii. P. i. ii.

		h. m. s.
° ′ ″ 4 41 19·026	=	8 32 24·113
E E′ E″ E‴ + x	=	8 32 24·463
		− 0·350

We may shew in like manner the consistency of the second with calculation v, as follows :

	h. m. s.	
Cal. v. True conjunction	May 31 1 33 47·3 at Jerusalem,	B. C. 710.
	+ 16 26 12·7	
	May 31 18 0 0·0	

	h. m. s.	° ′ ″
Supplementary Tables, Table xi. P. ii, iii, iv.	16 26 12·7	= 9 1 26·789580

We have then,

True mean conjunction in mean longitude,	Cal. v.	True conjunction in mean time,
M L = 60° 27′ 7″·752	M T	= May 31 1h. 33m. 47s·3
+9 1 26·790		+ 16 26 12·7
M L′ = 69 28 34·542	M T	= May 31 18 0 0·0
True M L, 70° 19′ 30″·789 } −M L′ −69 28 34·542 }	.. ..	May 31 18h. 0m. 0s·0
50 56·247	= (Table xii. P. ii.)	1h. 32m. 46s·767 = x.

Now, as before, Cal. v.

		h. m. s.
E E′ E″ E‴	=	5 43 52·7
+ x	=	+ 1 32 46·767
E E′ E″ E‴ + x	=	7 16 39·467

		° ′ ″
The true longitude, May 31 18 h. Calc. xi	=	70 19 30·789
The mean, ...	=	−66 19 46·778
		3 59 44·011

Now Table xii. P. i, ii.

		h. m. s.
3° 59′ 44″·011	=	7 16 39·595
E E′ E″ E‴ + x	=	7 16 39·467
		−0.128

To come then to the question which we began with proposing, The proper effect of the two miracles on the mean lunar momenta?

The calculations just completed are consistent with each other; and to a very great degree of correspondency. They prove therefore that mean lunar time and the mean lunar motion in longitude must have gone on, in the same or a corresponding manner, from any assumed date before the first miracle to any assumed one after the second; and from thenceforward to the present day. How then is this fact to be reconciled with that of the interposition of two such extraordinary events as these miracles, each at the proper time, between the same extremes?

The explanation of this anomaly is just the same with respect to the moon as with respect to the sun. By virtue of these two

miracles the Julian epoch of the mean solar longitude was twice depressed 12 hours of mean time and mean motion below what it was at first; and by virtue of the same two miracles the Julian epoch of the mean lunar longitude was twice depressed in the same manner also below what it was at first. There *is*, and there always *has been*, such a thing as the Julian epoch of origination of the mean lunar momenta, as much as of the mean solar; and this Julian epoch was April 25 at midnight B. C. 4004, primarily for the meridian of Jerusalem, secondarily for any other, in the case of the moon as much as in that of the sun. The moon had a certain mean longitude April 25 at mean midnight B. C. 4004 for every meridian under the sun in its turn; on which its actual mean longitude not merely on April 25 at mean midnight in any subsequent year, but on any day, and at any time of any day, and in any year, since this first of all, B. C. 4004, has been directly dependent, and still is so. And though no judicious astronomer, even in the present state of the lunar theory, would undertake to pronounce with confidence what that was; this uncertainty about its precise amount makes no difference to the fact of its existence: that some such actual mean longitude of origination at the proper time and for the proper meridian, (and that proper time the Julian April 25 at mean midnight B. C. 4004, and that proper meridian the meridian of the ancient Jerusalem,) there must have been.

It will be seen from the calculation of the new moon of April, B. C. 4004, which we shall have occasion to propose hereafter[h], that the difference between the mean longitude of our Lunar Tables, carried back so far, and the true mean longitude of the same epoch according to formula, was little less than *nine* degrees. For argument's sake however it is allowable to assume that even the mean lunar momenta of A. D. 1801 held good of B. C. 4004: and this being accordingly assumed, we may illustrate (though strictly speaking we cannot verify) the fact of which we are speaking; the depression of the epoch of the mean lunar motion in longitude, as referrible from the first to the same Julian term April 25 at mean midnight for the proper meridian, first by 12 hours, in consequence of the first miracle, and again by 12 hours, in consequence of the second.

i. The Julian epoch of our Lunar Tables being April 29 at 12 h. for the meridian of Greenwich, A. D. 1801—1804[i], in the mean

h Chapter v.
i Introduction to the Tables, Part iii. 219—225. ch. i. sect. viii–x.

motion of these Tables carried back 5804 mean Julian years, and for the meridian of Greenwich, we find

		°	′	″				
M L	=	3	34	10·734	April 29	12 h.	B. C. 4004.
Tab. xi. P. i.		−52	42	20·108	−4		
M L	=	310	51	50·626	April 25	12	B. C. 4004.
Tab. xiv.		+174	5	35·216			— 2484.
M L	=	124	57	25·842	April 25	12 h.	B. C. 1520.

		°	′	″			
M L	=	124	57	25·842	April 25	12 h.	B. C. 1520.
Tab. xi. P. i.		+52	42	20·108	+4		
M L	=	177	39	45·950	April 29	12 h.	B. C. 1520.

And this is the same which we found it to be calc. i. supra, by reckoning back from the epoch April 29 at 12 h. A. D. 1801 to April 29 at 12 h. B. C. 1520. Consequently up to this point of time, only 31 days before May 30, the date of the last full moon before the first miracle, (whatsoever the true mean longitude of April 25 at 12 h. or at midnight might have been,) the mean lunar longitude of this same Julian term April 25 at 12 hours, or at midnight, for a given meridian perpetually, at all intermediate points of time, as directly dependent on that, could not yet have been disturbed.

		°	′	″			
ii. Longitude of the Epoch, or M L		310	51	50·626	April 25	12 h.	B.C. 4004.
Table xi. P. ii.		−6	35	17·514		−12	
M L	=	304	16	33·112	April 25	at midnight.	
Table xi. P. i. 365 × 2	=	+258	46	9·713			−2.
M L	=	203	2	42·825	April 25	0	B.C. 4002.
Table xiv.		+ 98	32	54·690			— 3292.
M L	=	301	35	37·515	April 25	0	B.C. 710.
Table xi. P. i, ii.		+59	17	37·622	+4	12	
M L	=	0	53	15·137	April 29	12	B.C. 710.

And this is the same which we found from calc. iv. supra, by reckoning back from the epoch April 29.12 A.D. 1803 to April 29.12 B. C. 710. It is evident therefore that, between April 29 at 12 h. B. C. 1520 and April 29 at 12 h. B. C. 710, the Julian epoch of mean lunar longitude, the mean longitude of this epochal lunar and Julian term April 25, at mean noon or at mean midnight, had already dropped 12 hours of mean time and mean motion behind what it began with being B. C. 4004; though it had not yet dropped

more. It is manifest at least that the assumption of such a descent is agreeable to phenomena, and competent to account for and explain them; such as we find them by means of actual calculation, carried back from the present day both to B. C. 1520 and to B. C. 710.

iii. Longitude of the Epoch, or M L	=	310° 51′ 50″·626	April 25	12 h.	B. C. 4004.
Table xi. P. i.		−13 10 35·027	— 1		
M L	=	297 41 15·599	April 24	12 h.	A. D. 4004.
Table xiv.		+27 38 51·077			— 5804.
M L	=	325 20 6·676	April 24	12 h.	A. D. 1801.
Table xi. P. i.		+65 52 55·135	+ 5		
M L	=	31 13 1·811	April 29	12	A. D. 1801.

i. e. the mean longitude of the Julian epoch of our Lunar Tables itself, April 29 at 12 h. for the meridian of Greenwich, A. D. 1801.

It is clear then even from this mode of proceeding with an hypothetical longitude, (which nevertheless *mutatis mutandis* represents the true,) that the mean or actual longitude of the epoch, whatsoever it was, the mean or actual longitude of this one lunar and Julian term, April 25 at mean noon or mean midnight, for a given meridian, B. C. 4004, in coming down from B. C. 4004 to A. D. 1801, some where or other in the intervening period of time must have fallen back on itself 24 hours. If it began with being that of April 25 at 12 hours, it has ended in being that of April 24 at 12 hours; i. e. the entire course and succession of the mean or the actual lunar motion in longitude is now and long has been as necessarily referrible to the mean or actual longitude of April 24 at 12 hours for the proper meridian, as it ever could have been at first to that of April 25 at 12 hours for the same meridian. It is impossible at least to deny that the supposition of such a depression of the epoch of the decursus from first to last on itself is agreeable to phenomena at all times, and to the matter of fact at the present day; nay more, that phenomena after a time and the matter of fact cannot be explained, nor reconciled to phenomena and the matter of fact before that time, without it. It is evident too that no part of this effect had yet been produced between April 25 at 12 h. B. C. 4004 and April 29 at 12 h. B. C. 1520; but that one half of it had been already produced between April 29 at 12 h. B. C. 1520 and April 29 at 12 h. B. C. 710; and the other half between April 29 at 12 h. B. C. 710 and April 29 at 12 h. at the present day. If so, the former must have been the doing of the first miracle of Scripture, and

the latter must have been that of the second; for the former comes in critically between April 29 at 12 h. B.C. 1520 and April 29 at 12 h. B.C. 710; the latter critically between April 29 at 12 h. B.C. 710 and April 29 at 12 h. at the present day *.

* It is very important to observe, with respect to this question in general of the effect of the two miracles on the reckoning of time before and after; that one of the most certain and most indubitable of its consequences was the *change of style* in the reckoning of the mean noctidiurnal cycle. The fact of this change is not to be questioned in the case of the second miracle; for no one can doubt that, if that miracle really took place, the style of 6 P.M. became sensibly and at once the style of 6 A.M.: that is, the natural reckoning of the noctidiurnal cycle was set back, in the contrary order to its natural course until then, 12 hours of mean time at once. The same change was not so sensible and obvious on the former occasion; and yet it was not less real on that than on the second. For if the actual course of noctidiurnal time, as it was going on previously, was suspended at that time for 12 hours, and the suspension was made critically at 6 A.M. for the proper meridian; no one can doubt that on that occasion too, when every thing began to proceed again as before, the style of 6 P.M. was carried on *de facto* in the form of 6 A.M.: that is, the ordinary reckoning of the cycle until then was reversed to the extent of 12 hours on that occasion too. And this, it should be remembered, was the first occasion of the kind. The second was merely a reiteration of that: the effect of which reiteration however and in the same way, as we have often observed, was to restore the style to what it had always been before either of these interruptions took place; so that the reckoning of noctidiurnal time in the mean cycle and in the actual cycle of the same kind, which had always gone on uniformly before the first miracle, began to go on uniformly again after the second: and have done so ever since. The only difference between the state of the case at first, and at present, in this respect is that both forms of a common succession are going on now from an epoch 24 hours of mean time, or one mean cycle of day and night, lower than that from which they set out at first.

Now this change in the style of the noctidiurnal reckoning of mean time, which was the effect of the miracles, combined with the depression of the epoch of mean Julian longitude (both lunar and solar) which was the effect of them also, has served a most important purpose perpetually. In all our calculations from the present day either backwards or forwards, we reckon from an epoch of the noctidiurnal cycle, which for the same meridian is supposed to be always the same, both in terms and in itself, mean noon or mean midnight: and yet, if each of these miracles happened in its proper order of time, it is certain that between the present day and B.C. 4004 such an hypothesis has been twice contradicted by the matter of fact. In all our calculations too we carry backwards or forwards an uniform measure of the noctidiurnal cycle both in time and in angular motion; 24 hours of mean time, 24 hours of mean motion, perpetually:

The state of the case then both at first and ever after has been the same with respect to the Julian epoch of the mean lunar motion in longitude, as with respect to that of the solar. Both had such an epoch at first; and both had the same. Each went on advancing upon it, according to its proper law, down to B. C. 1520. In reference to each it has been set back or depressed at the same time and

and each supposed to be the proper mean time and proper mean motion not only of one mean solar but of one actual solar day. And this hypothesis too, in going back from the present day to B. C. 4004, has been twice contradicted by the matter of fact; for there have been two actual solar days, between B. C. 4004 and the present day, each of which has contained one mean solar day and one half; 36 hours of mean solar time, and not merely 24. Now that this has never been found out, that this has never been detected by the matter of fact, that calculations carried back in this manner from the present day to any date between the two miracles, or beyond the first, have always been right in the conclusions at which they arrived, has been due to these two causes, conspiring and working together to the same effect; the change of the style in the reckoning of the noctidiurnal cycle, and the depression of the epoch of Julian longitude.

In going back from the present day, the nominal style of noon or midnight is never changed; nor is the mean longitude of actual noon or midnight ever in error; though mean noon twice differed *de facto* from actual, and mean midnight twice from actual also. But in going back every thing is to be supposed to be reversed, which took place contrary to the order of nature in coming down: and by the same steps and to the same degree also. The epoch of Julian longitude, which in coming down was twice depressed 12 hours below that of longitude absolutely, will twice have to be raised 12 hours in going back; once between B. C. 710 and B. C. 1520, and again between B. C. 1520 and B. C. 4004. The first rise will bring it within 12 hours of the epoch of mean longitude absolutely; the second will bring it up to it. And as this epoch itself has never varied, and mean longitude reckoned from it to any point has always been the same; the consequence of all these concurrent circumstances would be that, though mean noon and mean midnight, in going back beyond B.C. 710 and beyond B. C. 1520, must twice change their style 12 hours in the proper order of the cycle, actual noon and actual midnight (which nominally are always the same) would never exhibit any change in their character, derived from their proper longitude, even at these points of time; reckoned too whether from the epoch of Julian longitude or from that of mean longitude absolutely. We know not whether we have expressed ourselves intelligibly on this point or not: but the matter of fact is as we have stated it; viz. that there never has been any error in calculations carried back from the present day beyond the epoch of either or both the miracles, though made in entire ignorance of those miracles or of their proper effect; at least from *that* cause merely: and we believe that this is the true explanation of the fact.

to the same extent; 12 hours in B. C. 1520 after the first miracle, and 12 in B. C. 710 after the second: and in reference to each it has been ever since just what it became by virtue of this last affection, April 24 at mean noon or mean midnight in the local time of every meridian under the sun; instead of April 25.

The epoch of mean longitude itself indeed, with reference both to the moon and the sun, is still what it always was. *That* has never fallen back on itself. It is as certain also in the case of the moon as in that of the sun that the mean longitude of this Julian term, April 25 at first April 24 at present, was exactly the same perpetually, reckoned whether from the epoch of mean longitude, or from what we have called the epoch of Julian longitude. There can be no doubt of that, as long as the epoch of Julian longitude was not yet distinguishable from that of mean longitude itself. It is equally true, now that the former has fallen 24 hours behind the latter. The mean longitude (lunar or solar) of April 24 at mean noon or mean midnight for a given meridian is just the same at present, whether reckoned from the epoch of mean longitude, (which of course is the point of the mean vernal equinox perpetually,) or from the epoch of Julian longitude, 24 hours behind it. The absolute interval which measures the duration of the present system of things, in terms of its proper Julian time and in terms of the mean lunar or solar motion in longitude proper to it also, is no longer reckoned *from* the point of the mean vernal equinox as it was at first perpetually; but *from* a point 24 hours behind it: and no longer *to* April 25 at mean noon or mean midnight perpetually as it was at first; but *to* April 24 at mean noon or mean midnight: but the mean longitude (lunar or solar) of April 24 at mean noon or mean midnight, in this particular reference to the duration of the present system, is just the same, whether reckoned from the mean vernal equinox, or from the epoch of Julian longitude, 24 hours behind it. In short, nothing is different in this respect in the case of the moon, any more than in that of the sun, at present, except the place in the order of feriæ, or order of the hebdomadal cycle, which the Julian epoch of lunar time, or any other lunar term under its proper Julian denomination, occupies at present, compared with that which it occupied at first; or which it would be occupying at present if the relation of the Julian term of origination to the feria of origination also had never been disturbed from the beginning of things to the present day. And with the illustration of this point in the case of the moon[k] we will conclude this part of our subject.

In the lunar period of 3760 mean lunations there are 111 035

[k] Cf. the Introduction to the Tables, 217, 218. Part iii. ch. i. sect. vii.

cycles of day and night (24 mean solar hours); and these = 15 862 cycles of sevens, and one term over of the 15 863 d. On this principle, mean lunar time measured by the cycle of day and night (24 mean solar hours) perpetually, in the period of 3760 mean lunations should rise one term higher in the order of feriæ, from period to period; and, if it set out in the first such period on the feria quinta, at the beginning of the twentieth it ought to be found on the feria tertia, $(5+19=24=3.)$ Now the first lunar term of the first period of this kind did actually enter our Tables B. C. 4004, under the name of April 29, on the feria quinta at midnight. The first similar term of the 20th enters our Tables A. D. 1773, under the name of April 10, at midnight too; but the Dominical Letter of the year being F, April 10 was the feria quarta, not the feria tertia, at midnight. The lunar feria of origination then at the ingress of period xx was represented by the feria tertia; and yet the Julian epoch of this period April 10 was the feria quarta. There is no difficulty in this phenomenon, as concerns the moon, nor any novelty; for it has been seen that the very same thing holds good in the case of the sun. Both cases are reducible under the same category, and both are to be explained on the same principle; viz. that by virtue of the change which has taken place in the epoch of origination of the entire succession of Julian terms, in constant connection with the actual feriæ of the hebdomadal cycle, (in which no change has ever taken place,) a lower Julian term now represents the original feria of an higher one; April 24 for instance that of April 25, and April 9 that of April 10.

Thus much may suffice in answer to the question which we began with proposing. We were long of opinion ourselves that the moon was the subject of a particular affection, on the first of these occasions at least; (of which the moon only, and not the sun also, could have been capable;) viz. the suspension of its proper motion in its own orbit for 12 hours of mean time. But we have seen every reason to relinquish this opinion, and to acquiesce in that explanation of the effect which we have just given; an explanation as applicable to the moon as to the sun: by virtue of which too the specific affection, to which either was subjected and on each occasion, is resolvable only into a particular case of the general law which had prescribed and regulated the relations, both of time and of motion, in the natural and in the Julian year respectively, from the first. There is no question of any importance remaining, but that of the *visibility* of the moon, at the time when those words were addressed to it by Joshua; and that of the time when those words were uttered.

With regard to the time of the miracle itself, 6 A. M. mean time for the meridian of Jerusalem, we do not think any reasonable doubt can be entertained. But whether the words of Joshua on the morning of this memorable day, May 31 B. C. 1520, were uttered exactly at 6 A. M. the critical moment when the motion of the earth about its own axis must have been suspended, may very well be open to a question. Such a coincidence indeed was *possible;* but we cannot consider it to be probable: nor in fact do we consider it to have been necessary, if the actual instant of the miracle must still be 6 A. M. mean time, for the proper meridian, whether the command to the sun and the moon was uttered exactly at 6 A. M. mean time for that meridian, or a little before. We must first of all however say something of the time of sunrise; and of the time when the moon would be setting on this morning; and of the local or geographical peculiarities of the ancient Gibeon.

Sunrise being calculated for this day, and for the latitude of Jerusalem, according to the formula of which we shall give an account in the next chapter, we find

	h.	m.	s.	
True sunrise May 31	5	10	8·7	Apparent time.
The Equation of time —		11	24·1	
True sunrise May 31	4	58	44·6	Mean time.

The sun's true place in the Ecliptic (SL) at sunrise was 54° 17′ 16″·1. Consequently when 54° 17′ 16″·1 of the ecliptic was rising with the sun, the opposite point, 234° 17′ 16″·1 was setting. Now, Calc. x supra,

	°	′	″					
We had M L′	=242	30	0.6	May 31	6			mean time.
We have setting at sunrise	234	17	16·1	May 31	4	58	44·6	mean time.
Distance of M L′ from the setting point	8	12	44·5					

At this point of the ecliptic circle, 8° 12′ 44″·5 of the ecliptic would take up almost the same time to set as 8° 12′ 44″·5 of the equator; and these latter would take up 32 m. 50·966 sec. or 32 m. 51 sec. exactly. On this principle, the point of the ecliptic occupied by the moon at 6 A. M. mean time this morning must have been setting for the rational horizon of the country 32 m. 51 sec. after sunrise; i. e. at 5 h. 31 m. 36 sec. mean time. Consequently, since even its mean place and much more its true, (for it was moving from perigee at this time,) could not have been less than 16′ more advanced at 6 A. M. than half an hour before; it is manifest that for the rational horizon of the country it must have been set 28 m. 24 sec. at least before 6 A. M. mean time.

We have not however as yet made any allowance for the effect of refraction; the nature of which is to render all luminous bodies visible a certain length of time before they are actually in the plane of the rational horizon, and a certain length of time after they are actually below it. And though the effect of refraction itself is variable according to circumstances; it may be assumed that it makes a difference of 33′ = 2 m. 12 sec. of mean time under any circumstances. If the moon then could not have set physically before 5 h. 31 m. 36 sec. mean time, it might still be visible, by virtue of refraction, at 5 h. 33 m. 48 sec.

In the next place, we have made no allowance for the possibility of an error in our own determination of the moon's true place at 6 A.M. mean time, on this morning: and yet it is too much to suppose that, for so remote a point of time, and with formulæ, requiring more or less of correction to adapt them critically to it, our calculation should be absolutely correct. It is probable however that if our data can be depended on, it is in defect not in excess; i. e. the moon's true longitude may be greater than we have made it, but not less. Nor do we think our conclusion can be right, within 15′ or 20′ of the truth, either in excess or in defect: and that would make a difference of 1 m. and 20 sec. to the time of setting in question. On the whole then, what from the effect of refraction and what from the correction which may be required in the moon's place itself, it is far from impossible that it might still have been visible even for the level ground at 5 h. 35 or 36 m. mean time, on this morning; i. e. only 24 or 25 minutes before 6 A. M. And here the natural site of Gibeon and its relation to the circumjacent country is to be taken into account.

In D'Anville's map of the ancient Palestine, Gibeon is laid down N. E. of Ajalon, and Ajalon S. W. of Gibeon. Now if the time of the miracle at last was exactly 6 A.M. of mean time, (only one hour, one minute and 15 seconds after sunrise in mean time also,) it is manifest that the sun must have attained to an elevation of 15°: and yet it might still be in or over Gibeon, as it was when those words were addressed to it by Joshua. The azimuth of the sun then at this moment being calculated from the formula

Log. Cos. Azimuth from the N = Log. S. of Declination
—Log. S. of Latitude,

it is found to have been 22° 46′ 13″ east from the north point; and consequently the moon's (8° or 9° east of the opposite point in the ecliptic) about 30° 46′ 13″ west of the south point. Their respective positions consequently were in accordance with the position of

Gibeon relatively to that of Ajalon, and *vice versa*, as laid down in D'Anville's map.

The distance of Gibeon from Ajalon in the same map is three Roman miles = 2·4 or 2 and nearly one half English. The diameter of the sensible horizon under ordinary circumstances, and where there is no particular inequality in the surface of the country, is about 6 miles: that is, the view which a man of ordinary stature under such circumstances could command on all sides would be about 3 miles. On this principle, if Gibeon and Ajalon had both been situated on level ground, yet in other respects relatively to each other as before, to a spectator under the walls of Gibeon the moon in Ajalon at this time must have appeared to be as nearly as possible on the verge of the sensible horizon.

The ancient Gibeon however was not situated on level ground. Its name implies that it was built on an eminence of some kind; and in D'Anville's map it stands at the apex of a kind of pyramid of hills, the base of which appears to rest on Soco (the Shocho of Scripture) to the west, and on the sea of the plain to the east. *Γαβαὼν*, observes Eusebius [l], *ὅθεν ἐλθόντες οἱ Γαβαωνῖται ἱκέται γίνονται τοῦ Ἰησοῦ. ἦν δὲ αὕτη μητρόπολις μεγάλη καὶ βασιλικὴ τῶν Εὐαίων, ἣ καὶ γέγονεν ἐκ κλήρου Βενιαμίν. καὶ ἔστι κώμη νῦν οὕτω καλουμένη. πλησίον Βαιθὴλ πρὸς δυσμὰς ὡς ἀπὸ σημείων δ΄. παράκειται δὲ τῇ Ῥαμᾷ*—Gabaon unde Gabaonitæ supplices venerunt ad Jesum: erat olim metropolis et regalis Evæorum: ceciditque in sortem tribus Benjamin. et nunc ostenditur villa eodem nomine. in quarto milliario Bethelis (corr. Bethel) contra occidentalem plagam. juxta Rama et Remmin [l]—*Αἰλὼμ φάραγξ, καθ' ἧς ἔστη ἡ σελήνη εὐξαμένου Ἰησοῦ. ἐγγὺς κώμη* (ita leg.) *ἐστὶ νῦν Αἰλὼν καλουμένη. ἐξ ἀνατολῶν Βαιθὴλ σημείοις τρισὶ διεστῶσα. παράκειται δὲ αὐτῇ Γαβαὰ καὶ Ῥαμαὰ πόλεις Σαοὺλ* [m] — Aialon vallis atque præruptum, super quod orante quondam Jesu luna stetit. juxta villam (*leg.* villa) quæ usque nunc Ailon dicitur. contra orientem Bethelis (*leg.* Bethel) tribus ab ea millibus distans, haud procul a Gabaa et Rama Saulis urbibus [m]. (porro Hebræi affirmant Ajalon vicum esse juxta Nicopolim in secundo lapide pergentibus Æliam.) *

This last remark that Ajalon, in the time of Jerome and according to his Hebrew authorities, was the name of a village two miles

* We have taken the liberty of correcting the punctuation, and, in one or two instances, the text of these passages, in order to render the description agreeable to the actual geographical positions of the places mentioned in it, relatively to one another, according to the best maps at present.

l Apud Hieronymum, Opera, ii. 447, *ἀπὸ τοῦ Ἰησοῦ*. m Ibid. ii. 395.

from Nicopolis on the high road to Ælia (the name of Jerusalem in his time) was added by Jerome himself. But it is a very important one; and does more to fix the site of Ajalon than any other particular of the above description. Eusebius styled Ajalon *φάραγξ*. Jerome terms it Vallis atque præruptum. Both mean the same thing, a valley with a precipice on one side or both; an opening between mountains; a cleft or fissure in a chain of mountains; not sloping or shelving but abrupt and steep: for that is the proper sense of *φάραγξ* in Greek. If we turn to the maps of Palestine we observe one range of mountains running due west from Ajalon to Nob; and another running north east from Ajalon to Archelais; (the ascent of Acrabbim in Scripture, the Acrabatene of Josephus;) and between these an opening, through which the high road from Nicopolis to Jerusalem must once have passed, Nicopolis in D'Anville's map being laid down there. We are entirely of opinion that the Ajalon of Joshua's time was situated at the mouth of the same opening; and so gave name to the valley called after it also. The same opening was opposite to Gibeon also. There was nothing apparently to obstruct the view through that opening westward from Gibeon, even as far as the Mediterranean sea*. Here then the moon must

* We extract the following account of the Gibeon of Scripture, and the circumjacent country, from Robinson's Biblical Researches in Palestine.

Vol. iii. 58–67: "At 10 h. 20 m. we came to a village on the top of the low ridge, called Beit'-ûr el-Tahta (the lower).. doubtless the nether Beth-horon of the Old Testament... At 11 h. 20 m. we came out on the summit of the promontory, where stands the village Beit'-ûr el-Foka (the upper), on an eminence upon the very brow of the mountain, with a deep valley on each side, both north and south. Further east, towards the plain around El-Jîb, the ground still rises in rocky hills; but with a much more gradual ascent——Beit'-ûr the upper and lower; the ancient upper and nether Beth-horon——The nether Beth-horon lay at the N.W. corner of the territory of Benjamin; and between the two places was a pass, called both the ascent and descent of Beth-horon, leading from the region of Gibeon (El-Jîb) down to the western plain.... He (a certain inhabitant of Beit'-ûr) led us to the roof of a house, where we had a wide and very distinct view of the country around Beth-horon, and towards the sea.... The prospect included the hill country and the plain, as far on the right and left as the eye could reach. The prominent towns were Ramleh and Lydda.... Between us and Ramleh we looked down upon a broad and beautiful valley at our feet, formed by the junction of Wady-Suleimân, the Wadys on the N. and S. of Beit'-ûr, and others. This valley or rather plain runs out W. by N. quite through the tract of hills, and then bends off S.W. through the great western plain....

"The interest of this fine plain or valley is enhanced by its probable

have been seen, if at all, when Joshua addressed those words to it, between sunrise and 6 A.M. mean time; from Gibeon indeed, or

connexion with a remarkable event of Biblical history. Upon the side of the long hill which skirts the valley on the south, we could perceive a small village on the W.S.W. called Yâlo; which name cannot well be any other than the ancient Ajalon.... There can therefore be little question that this village marks the site of an ancient Ajalon; and that the broad Wady on the north of it is the valley of Ajalon, so renowned in the history of Joshua....

"The land around upper Beth-horon is exceedingly rocky, affording little opportunity for tillage. We left the place at 12 o'clock, and continued to ascend gradually among rocky and desolate hills... At 1h. 56m. we came out upon the top of the whole ascent, and reached the edge of the plain on the west of El-Jîb. Here we had Beit'-ûr, El-Jîb, and Neby Samwîll all in sight at once.... We could here look down into Wady-Suleimân on our right; which begins to descend directly from the western end of the plain: and could perceive the other road as it comes up that valley.

"We kept on our way to El-Jîb &c."

Vol. ii. p. 134–139: "We now bent our course towards El-Jîb, lying S. by W.½W. Leaving Râm-Allah at 12 o'clock,....at 1h. 10m. (we) passed near a village (Râfât?) on our left. Here we came upon a beautiful plain, which extends far west, nearly to the brow of the mountains, and also towards the east and south; in which direction it is bounded by the lofty ridge of Neby Samwîll. In this plain, towards the south, separated from the base of Neby Samwîll by a narrow fertile tract, is the isolated oblong hill or ridge, on which El-Jîb is situated. It is composed of horizontal layers of limestone rock, forming almost regular steps, rising out of the plain; in some parts steep and difficult of access, and capable of being everywhere very strongly fortified. The camel road from Jerusalem to Ramleh leads along the northern side of the hill, passing onwards across the plain till it divides, and descends the mountain both at Beit'-ûr and through Wady-Suleimân. In the west is spread out the fine meadow-like plain, with a large neglected well at some distance, called Bîn el 'Özeiz. The hill may be said to stand in the midst of a basin, composed of broad vallies or plains, cultivated, and full of grain, vineyards, and orchards of olives and fig-trees. It was decidedly the finest part of Palestine which I had yet seen.

"Indeed the whole tract, west of the main water-shed, seems to be less rocky and sterile than that along the eastern slope. The rock is apparently softer, and is more easily disintegrated into soil. The open tract or basin around El-Jîb however lies upon a secondary division of the waters; those of its western end descending directly towards the Mediterranean; while those of the middle and eastern parts flow around the northern end of the ridge of Neby Samwîll into the deep valley which runs off S.W. between that ridge and Jerusalem to the western plain.

under Gibeon, on the east, yet up this valley, or in this plain, of Ajalon on the west.

"We reached the village of El-Jîb, situated on the summit of this hill, at a quarter before two o'clock. It is of moderate size; but we did not learn the number of souls . . . Towards the east the ridge sinks a little . . . It is not difficult to recognise in El-Jîb and its rocky eminence the ancient Gibeon of the Scriptures . . .

"We left El-Jîb at 2 h. 25 m. descending on the southern quarter, through orchards of pears, apples, figs, and olives, and also vineyards, into the narrow strip of plain which skirts the hill upon this side. We now had before us the elevated ridge of Neby Samwîl; which beginning at no great distance on the left rises rapidly towards the S.W. into the highest point of land in the whole region; and then sinks off gradually in the same direction into lower and less marked hills and ridges. Its general course is thus from N.E. to S.W. The elevation cannot be less than some 500 feet above the plain . . . .the top is crowned by a small miserable village, and a neglected mosk. This point we reached at 2 h. 55 m. in half an hour from El-Jîb; and found ourselves on the most sightly spot in all the country."

Thus far the "Biblical Researches." There is no difficulty in following this account and these descriptions even in D'Anville's map of Ancient Palestine, the accuracy of which is greatly illustrated thereby. It appears from the account that there was a narrow strip of land (a narrow plain or valley) between the rock on which Gibeon stood and the summit of what is here called Neby Samwîl. The same is the case with D'Anville's Gibeon also. It stands at least a little to the N.W. of the apex of that pyramid of hills, to which we alluded; and which is now the Neby Samwîl; though it is probably somewhat too elevated in comparison of it. We apprehend the Ramleh in the above description to be the ancient Ramah. The reader will observe that the modern name of such valleys as that of Ajalon is Wady; and the valley of Ajalon in question appears to be now the Wady Suleimân: the depression or descent of which began directly at the western end of the plain of Gibeon itself; and the south side of which (to the view of one coming from the north or from Beit-ûr) was flanked by the long hill, W.S.W. on which lay the small village of Yâlo. It is not distinctly stated in this account whether the rock of Gibeon lay W. and E. or N.E. and S.W.: though in Robinson's map, Gibeon is laid down due east of Yâlo. In either case, the sun (at that time 22° 46′ east of the north point) from the plain beneath, between Gibeon and the valley of Ajalon, must have been seen over the east or N.E. end of it. This plain was no doubt the scene of the battle: and somewhere upon it, between Gibeon and Ajalon, must those words have been spoken by Joshua. The flight of the Canaanites took the direction on one side of Beth-horon, on the other of Azekah and Makkedah; and in this latter direction they must have been pursued by Joshua in person, if he was at Makkedah 12 hours after.

There is a phenomenon of which astronomers speak, called the Dip of the Horizon; and which is very observable at sea: and for the correction of which in Nautical Astronomy an instrument is constantly wanted called the Dip-Sector. The effect of the dip is to make objects visible on or above the horizon which are really below it: and it is calculated in tables constructed for the purpose that the dip makes a difference of 9′. 50″ at an elevation of 100 feet, of 14′. 0″, at one of 200, and of 17′, at one of 300 feet, or 100 yards. No doubt, this phenomenon is perceptible on land as well as at sea; especially from points of much greater elevation by land than can ever exist in the midst of the open sea: though there must always be much more to interfere with the effect of the dip, or the observation of the effect, by land, than by sea; because the field of view can never be so open and unobstructed by land as by sea. Something therefore may also be allowed for the effect of the dip, in the present instance; if the ground about Gibeon was comparatively elevated, and the valley of Ajalon comparatively low: though what, we do not undertake to say.

The result of these various considerations however must be that, if the moon could not have altogether disappeared under any circumstances, before 5 h. 31 m. 36 sec. mean time on the morning of this memorable day; it might be, and very probably must have been, still visible on the verge of the sensible horizon, at 5 h. 36 m. mean time. And this approaches so near to the actual time of the miracle, 6 A. M. that, even though those words might be uttered by Joshua at 5 h. 36m. mean time, or not much earlier, it cannot or ought not to be any difficulty that they would not on this principle be followed immediately by the effect. The final end of the miracle, proposed by Joshua, as we have collected from the circumstances of the event before and after, was to prolong the morning of the day for the sake of the pursuit: and to that particular object and purpose it is clear it could make no difference whether the motion of the earth around its axis was stopped at 5.36 A. M., or 24 minutes later. The proper time for giving effect even to the words of Joshua, in a case of this kind, must be left to the determination of the Author of the Miracle itself. It could be known only to Him at the time; and it could be fixed only by Him at the time: though, after what has been brought to light concerning the connection of this miracle itself with the entire course and succession of time of every kind before and after, even we ourselves possibly may now see that no time perhaps could be suitable for it but 6 A. M. mean time for the proper meridian; and consequently that, whensoever the words of

Joshua, which ultimately led to the effect, might have been pronounced, the effect would have been found from the event to have followed upon them at that moment, and not before it.

CHAPTER IV.

On the testimony extant to the second Miracle in particular, external to Scripture[n].

If we recur to this subject here, it is not because we have met with fresh testimony to either of the miracles external to Scripture, but simply in order to revise and reinforce certain parts of the evidence to the same effect already adduced. We have seen that the most general and permanent *sensible* effect which these miracles produced at the time, (especially the second,) was either a change of the primitive rule of the reckoning of the noctidiurnal cycle, or the introduction of some other which was not before in use; and its association with the primitive one for particular uses and purposes from that time forward: so much so that the proper testimony to and confirmation of the fact of these two miracles, (especially of that of the second, to which alone in reality this effect is to be attributed,) external to Scripture, is this very change in the noctidiurnal rule: which begins to appear in certain instances from the time of the second miracle, but not before it; and in some of these instances too has been perpetuated, exactly such as it became in consequence of that miracle, from the time of the miracle to the present day. This part of the argument from external testimony is capable of being placed in a more striking point of view, and of being rendered more conclusive and more convincing. We propose therefore to revise it in the present chapter; though as briefly as may be consistent with justice to the subject itself.

For this purpose we shall have to go over some of our calculations again, especially of the times of sunrise or sunset, and of the kairic hours both of day and of night for various latitudes. The simplest formula for finding sunrise or sunset on a given day for a given latitude is that to which we alluded *supra*[o]:

i. Log. sine of SL′ + Log. sine of ω = Log. sine of D.
ii. Log. tang. of D + Log. tang. of L = Log. cos. of SNA:

in which SL′ stands for the sun's true longitude at sunrise or sunset in question, ω for the obliquity of the ecliptic at the proposed epoch, D for the sun's declination at sunrise or sunset, L for the lati-

[n] Vol. i. 321—383. Diss. v. ch. iv. [o] P. 588.

tude of the place, and SNA for the seminocturnal arc (the interval, in apparent time, between sunset and midnight, or midnight and sunrise). These formulæ presuppose nothing which may not be found from our own Tables, or from Delambre's Solar Tables along with ours[p], and the common Tables of Logarithms. And though in their application the sun's place and the declination are assumed to be constant between one sunset and one sunrise, or one sunrise and one sunset, in sequence, (which can never be absolutely the case), yet the times so found will be sufficiently near to the truth in every instance to answer *our* purpose; and to serve as the data for the representation of diurnal or nocturnal hours in the true kairic division of that kind, which must have been current at the times and for the places in question.

The moment of true sunrise or true sunset is that only when the centre of the sun is in the plane of the rational horizon; but in all cases of this kind refraction is to be taken into account: and the effect of refraction is to make apparent sunrise everywhere somewhat earlier than true, and apparent sunset everywhere somewhat later than true. True kairic time however, in the sense of actual, in all such cases must be dated from apparent sunrise or apparent sunset, not from true; and we shall so date it ourselves in every instance. And though the absolute effect of refraction is liable to vary with circumstances, we shall assume that there is such a thing as a constant of refraction, which cannot be estimated at less than 33′ any where = ∓2 min. 12 sec. in time; − in anticipating the true time of sunrise, + in postponing that of sunset*.

* We begin with proposing a more exact determination both of sunrise May 31 B. C. 1520, and of sunrise May 31 B. C. 710, for the latitude of Jerusalem, than we have already given.

We embrace this opportunity also of correcting the calculation of the summer solstice B. C. 1520 for the meridian of Jerusalem, which we gave vol. i. 258: and also of calculating the time of sunrise at the summer solstice and the length of the longest day for that latitude, to which we referred vol. i. 258.

			h.	m.	s.	
i. Tabular mean V. E.	April	5	17	47	24·0	B. C. 1520
Correction			+	11	9·6	
True mean V. E.	April	5	17	58	33·6	
i Quarter, Supplementary Tables, Table i.		91	7	27	12·6	
Mean summer solstice	July	6	1	25	46·2	
Equation of the centre		+1	7	32	9·5	
True summer solstice	July	7	8	57	55·7	

p Introduction to the Tables, 195. Part iii. ch. i. sect. i.: 202. sect. v.: 206. sect. vi.: 267. sect. xx. Supplementary Tables, v.: vii. Part i.—iv.: xlviii.

i. Calculation of sunrise, for the latitude of Jerusalem, May 31 B.C. 1520. Vol. i. 266, 267.

SL′ = 54° 17′ 16″	May 31.	4h. 58m. 44s. Mean time.
ω = 23 53 12		Approximate date of sunrise.
L = 31 47 47. N.		

i.	Log. sine of SL′ =	Log. sine of 54° 17′ 16″	=	9·909 534 1
	+ Log. sine of ω =	Log. sine of 23 53 12	=	+ 9·607 378 6
	Log. sine of D =	(Log. sine of 19 11 42)	=	9·516 912 7
ii.	Log. tang. D =	Log. tang. of 19° 11′ 42″	=	9·541 752 6
	+ Log. tang. L =	Log. tang. of 31 47 47	=	+ 9·792 349 0
	Log. cos. SNA =	(Log. cos. of 77 32 10)	=	9·334 101 6

		h.	m.	s.	
Length of seminocturnal arc		5	10	8·666	app. t.
True sunrise	May 31	5	10	8·666	app. t.
Apparent sunrise	May 31	5	7	56·666	app. t.
Apparent sunset	May 30	18	52	3·334	app. t.
Nocturnal hour, sunset to sunrise		0	51	19·444 3	sec.
Diurnal hour, sunrise to sunset		1	8	40·555 7	app. t.

῞Ωραι καιρικαὶ, from sunset May 30 to sunrise May 31 B. C. 1520, for the latitude of Jerusalem.

Hours.	h.	m.	s.		Hours.	h.	m.	s.	
i.	6	52	3·334	P.M. May 30	vii.	12	0	0·0	A.M. May 31
ii.	7	43	22·778 3		viii.	0	51	19·444 3	
iii.	8	34	42·222 6		ix.	1	42	38·888 6	
iv.	9	26	1·666 9		x.	2	33	58·332 9	
v.	10	17	21·111 2		xi.	3	25	17·777 2	
vi.	11	8	40·555 5		xii.	4	16	37·221 5	

ii. At the summer solstice SL′ = 90°: and the sine of 90° = 0. The Declination = the Obliquity; and the obliquity B. C. 1520, calculated from the formula of Bessel (Supplementary Tables, Table xlviii. Introduction, 267) = 23° 53′ 12″. The formula therefore in this case becomes

Log. tang. D. =	Log. tang. 23° 53′ 12″	=	9·646 267
+ Log. tang. L. =	Log. tang. 31 47 47	=	+ 9·792 349
Log. cos. SNA =	(cos. 74° 3′ 54″)	=	9·438 616

From which we get

		h.	m.	s.	
True sunrise	July 7	4	56	15·6	app. time.
App. sunrise	July 7	4	54	3·6	
Half day ..		7	5	56·4	
Whole day ..		14	11	52·8	inclusive of refraction.

	h.	m.	s.	
ist Hour of day	5	7	56·665 8	A.M. May 31
	+	2	12	
ist Hour	5	10	8·666	From true sunrise.
iid	6	18	49·222	App. time.
Equation of time	−	11	24·1	
iid Hour of day	6	7	25·122	Mean time.
Miracle	6	0	0·0	
Date of the miracle	0	7	25·122	Before the second hour of day, mean time.
	0	18	49·222	App. time.

ii. Calculation of sunrise for the latitude of Jerusalem, May 31 B.C. 710. Vol. i. 295.

SL′ = 60° 13′ 26″ May 31 4h. 56m. 45s. Mean time. Approximate sunrise.
ω = 23 47 1
L = 31 47 47. N.

i. Log. sine of SL′	= Log. sine of 60° 13′ 26″	=	9·938 506 0
+ Log. sine of ω	= Log. sine of 23 47 1	=	+ 9·605 610 5
Log. sine of D	(Log. sine of 20 29 23)	=	9·544 116 5
ii. Log. tang. of D	= Log. tang. of 20 29 23	=	9·572 500 1
+ Log. tang. of L	= Log. tang. of 31 47 47	=	+ 9·792 349 0
Log. cos. SNA	(Log. cos. of 76 36 19)	=	9·364 849 1

		h.	m.	s.	
Semi-nocturnal arc		5	6	25·266 6	
True sunrise	May 31	5	6	25·266 6	Appar. time
Apparent sunrise	May 31	5	4	13·266 6	Appar. time
Length of the day		13	51	33·466 8	
Diurnal hour		1	9	17·788 9	
⅓ of the diurnal hour, ⅓ of the Maaloth of the dial of Ahaz ..			23	5·929 6	
Ten hours of kairic diurnal time ..		11	32	57·889	
Defect on 12 hours of mean time ..			27	2·111	

Ὧραι καιρικαὶ, from sunrise to sunset May 31 B.C. 710, for the latitude of Jerusalem.

Hours.	h.	m.	s.		Hours.	h.	m.	s.	
i.	5	4	13·266 6	A.M. May 31	vii.	12	0	0·000 0	P.M. May 31
ii.	6	13	31·055 5		viii.	1	9	17·788 9	
iii.	7	22	48·844 4		ix.	2	18	35·577 8	
iv.	8	32	6·633 3		x.	3	27	53·366 7	
v.	9	41	24·422 2		xi.	4	37	11·155 6	
vi.	10	50	42·211 1		xii.	5	46	28·944 5	

i. Hour of Night, 6h. 55m. 46·733 4s. P.M. May 31.

	h. m. s.		h. m. s.
Date of the miracle in m. t.	May 31 18 0 0	Miracle in app. time	May 31 18 9 33·0
Equation of time	+ 9 33·02		− 12
Date in app. time	May 31 18 9 33·02	Restitution of the sun	May 31 6 9 33·0
xiith hour of day	17 46 28·944 5	2nd hour of the day	6 13 31·1
Date in the xiith h.	23 4·075 5		
One third of xiith h.	23 5·929 6		
Date of the miracle before the end of the first third of the xiith hour	1.854 1	Date of the restitution in the second hour of day	3 58.1

This more exact calculation then is well adapted to confirm the conclusions respecting the actual date of the miracle in the kairic time of the day, and respecting the division of the Maaloth of the dial into three equal parts, (one third of the diurnal hour of the season,) at which we arrived before. For we see that it happened so critically before the termination of the first third of this kind in the xiith hour, as to anticipate only 2 seconds upon it even according to our calculation; from which we may very reasonably infer that it actually coincided with it. We see also that the restitution of diurnal time would bear date only 3 m. 58 sec. after the point of the second hour of the day. We see too that ten hours of kairic time at this season of the year were equal to 11 h. 32 m. 58 sec. of mean time, but still wanted 27 m. 2 sec. of 12.*

* We subjoin here also the calculation of the time of sunrise and of the length of the day at the summer solstice, B.C. 710, for the latitude of Jerusalem, to which we had occasion to refer, vol. i. 296.

$$SL' = 90^\circ\ 0'\ 0''$$
$$\omega = 23\ 47\ 1 = D.$$
$$L = 31\ 47\ 47\ N.$$

Hence, we have from formula,

$$\text{Log. tang. of } D = \text{Log. tang. } 23^\circ\ 47'\ 1'' = 9{\cdot}644\,153\,8$$
$$+\text{Log. tang. of } L - \text{Log. tang. } 31\ 47\ 47 = +9{\cdot}792\,349\,0$$
$$\text{Log. cos. SNA } (74^\circ\ 8'\ 40'') = 9{\cdot}436\,502\,8$$

From which we obtain

	h. m. s.	
True sunrise	4 56 34·666	Apparent time
Apparent sunrise	4 54 22·666	Apparent time
Length of the day	14 11 14·6	
Diurnal hour	1 10 56·216 66	
Ten hours	11 49 22·166 6	
Defect on 12 hours of mean time	10 37·833 4	

iii. Calculation of sunset, May 31, B.C. 710, for the latitude of Memphis, or Heliopolis. Vol. i. 327.

SL′ = 60° 46′ 52″	May 31	18h. 40m. 59s.	mean time. Approximate sunset.
ω = 23 47 1			
L = 30 2 4. N.			

i.	Log. sine SL′ = Log. sine 60° 46′ 52″ =	9·9408954
+	Log. sine ω = Log. sine 23 47 1 =	+9·6056105
	Log. sine D (Log. sine 20 36 28) =	9·5465059
ii.	Log. tang. D = Log. tang. 20° 36′ 28″ =	9.5752227
+	Log. tang. L = Log. tang. 30 2 4 =	+9·7620421
	Log. cos. SNA (Log. cos. 77 26 37) =	9·3372648

We also subjoin the correction required by the calculation which we proposed in vol. i. at p. 302.

i. Sun's true place, or SL′, May 31 at 6 A.M. mean time B.C. 1520, for the meridian of Jerusalem.

		h. m. s.	
Tabular mean V.E.	April 5	17 47 24·0	B.C. 1520
Correction ..	..	+ 11 9·6	
True mean V.E.	April 5	17 58 33·6	

	° ′ ″		h. m. s.
SL =	0 0 0·0	April 5	17 58 33·6
	+54 42 15.858		+55 12 1 26·4
SL =	54 42 15·858	May 31	6 0 0·0
Equation of the centre	−22 33·3		
SL′ =	54 19 42·558	May 31	6 0 0

Equation of time = ∓ 11m. 24·1 sec. Subtractive from apparent time
Additive to mean.

ii. Sun's true place, or SL′, May 31 at 18h. mean time, for the meridian of Jerusalem, B.C. 710.

		h. m. s.	
Tabular mean V.E.	March 30	11 7 48·0	B.C. 710
Correction ..	..	+ 12 11 9·6	
True mean V.E.	March 30	23 18 57·6	

	° ′ ″		h. m. s.
SL =	0 0 0·0	March 30	23 18 57·6
	+60 53 30·499		+61 18 41 2·4
SL =	60 53 30·499	May 31	18 0 0
Equation of the centre	− 8 54·2		
SL′ =	60 44 36·299	May 31	18 0 0

Equation of time = ∓ 9m. 31·2 sec.

	h.	m.	s.	
Seminocturnal arc, ..	5	9	46·4666	
True sunrise, May 31 ..	5	9	46·4666	App. time
Apparent sunrise, May 31	5	7	34·4666	App. time
Diurnal hour, ...	1	8	44·25556	

῾Ωραι καιρικαὶ, from sunrise to sunset, May 31 B.C. 710, for the latitude of Memphis or of Heliopolis.

Hours.	h.	m.	s.		Hours.	h.	m.	s.	
i	5	7	34·4666	A.M. May 31	vii	12	0	0.0000	P.M. May 31
ii	6	16	18·72216		viii	1	8	44·25556	
iii	7	25	2·97772		ix	2	17	28·51112	
iv	8	33	47·23328		x	3	26	12·76668	
v	9	42	31.48884		xi	4	34	57·02224	
vi	10	51	15·74440		xii	5	43	41·27780	

i Hour of Night, 6 h. 52 m. 25·53336 P.M. May 31 apparent sunset in apparent time.

		h.	m.	s.
Mir. at Jerusalem, m. t.	May 31	18	0	0·0
Meridians ..		−	15	44
At Memphis, mean time	May 31	17	44	16
Equation of time		+	9	31·1
At Memphis, app. time	May 31	17	53	47·1
xiith hour of day		17	43	41·3
Date of the miracle in the xiith hour, at			10	5·8

		h.	m.	s.
Mir. at Memphis, app. t.	May 31	17	53	47·1
		− 12		
Restitution,	May 31	5	53	47·1
1st hour of day		5	7	34·5
Restitution, in the 1st hour, at			46	12·6

iv. Calculation of sunrise, May 31 B.C. 710, for the latitude of Athens. Vol. i. 342.

$SL' = 60° 14' 40''$ May 31 4 h. 41 m. 50 s. mean time. Approximate sunrise.
$\omega = 23\ 47\ 1$
$L = 37\ 58\ 8$. N.

i. Log. sine SL′	= Log. sine 60° 14′ 40″	=	9·9385951
+ Log. sine ω	= Log. sine 23 47 1	=	+9·6056105
Log. sine D	(Log. sine 20 29 39)	=	9·5442056

ii. Log. tang. D	= Log. tang. 20° 29′ 39″	=	9·5726028
+ Log. tang. L	= Log. tang. 37 58 8	=	+9·8923237
Log. cos. SNA	(Log. cos. 73 2 26)	=	9·4649265

		h.	m.	s.	
Seminocturnal arc,	..	4	52	9·7333	App. time
True sunrise, May 31	..	4	52	9·7333	App. time
App. sunrise, May 31	..	4	49	57·7333	App. time
Diurnal hour ..	..	1	11	40·37779	

Ὧραι καιρικαὶ, from sunrise to sunset, May 31, B.C. 710, for the latitude of Athens.

Hours.	h.	m.	s.		Hours.	h.	m.	s.	
i	4	49	57·7333	A.M. May 31	vii	12	0	0·0000	P.M. May 31
ii	6	1	38·11109		viii	1	11	40·37779	
iii	7	13	18·48879		ix	2	23	20·75558	
iv	8	24	58·86658		x	3	35	1·13337	
v	9	36	39·24437		xi	4	46	41·51116	
vi	10	48	19·62216		xii	5	58	21·88895	
					1 Hour of Night,	7	10	2·26674	P.M. May 31

		h.	m.	s.
Mir. at Jerusalem, m. t.	May 31	18	0	0·0
Meridians	..	−	45	51
At Athens, mean time	May 31	17	14	9·0
Equation of time		+	9	32·9
In app. time	May 31	17	23	41·9
xith hour of day		16	46	41·5
Date of miracle in the xith hour,	at ..		37	0·4

		h.	m.	s.
Sunset	May 31	19	10	2·3
Miracle ..	−	17	23	41·9
Before sunset		1	46	20·4
Miracle, app. t.	May 31	17	23	41·9
	−	12		
Restitution	May 31	5	23	41·9
ist hour of day		4	49	57·7
Restitution in the 1st hour, at	.. ..		33	44·2

The miracle therefore for this latitude preceded sunset by 1 h. 46 m. 20·4 sec., and its date in the style of the diurnal time of the season was 37 m. 0·4 sec. past the xith hour. It must therefore have closely confined on the time of supper at Athens, the eleventh or twelfth hour of the day[q]; as well as on that of sunset: in which two facts there would be a sufficient foundation both for the supposed time of the recession of the sun, in the Greek fable, sunset or about sunset, at this season of the year, and for its connection with the time of supper; and possibly through that even with the supper of Thyestes. It is observable that for this latitude, the miracle took place almost at the middle point of the eleventh hour, and diurnal time was restored almost at the middle point of the first. Ten hours of kairic time for this latitude and at this season = 11 h. 56 m. 44 sec. of mean time; that is only 3 m. 16 s. less than 12 hours.

q Fasti, vol. i. 190, 191. Diss. iv. ch. ii. sect. v.

v. Calculation of sunset May 31 B. C. 710, for the latitude of Persepolis. Vol. i. 350.

		°	′	″		h.	m.	s.	
SL′	=	60	43	19	May 31.	18	40	20	mean time. Approximate sunset.
ω	=	23	47	1					
L	=	30	0	0.	N. D'Anville.				

i. Log. sine of SL′	=	Log. sine of 60° 43′ 19″	=	9·9406443
+ Log. sine of ω	=	Log. sine of 23 47 1	=	+ 9·6056105
Log. sine of D		(Log. sine of 20 35 44)	=	9·5462548
ii. Log. tang. of D	=	Log. tang. of 20° 35′ 44″	=	9·5749415
+ Log. tang. of L	=	Log. tang. of 30 0 0	=	+ 9·7614394
Log. cos. of S N A		(Log. cos. of 77 28 10)	=	9·3363809

		h.	m.	s.	
Seminocturnal arc		5	9	52·666	
True sunset	May 31.	6	50	7·334	P. M. App. t.
Appt. sunset	May 31.	6	52	19·334	P. M. App. t.
True sunrise	May 31.	5	9	52·666	A. M. App. t.
Appt. sunrise	May 31.	5	7	40·666	A. M. App. t.
Diurnal hour,		1	8	43·2223	

Ὧραι καιρικαὶ, from sunrise to sunset May 31 B. C. 710, for the latitude of Persepolis.

Hours.	h.	m.	s.		Hours.	h.	m.	s.	
i	5	7	40·666	A. M. May 31.	vii	12	0	0·000	P. M. May 31.
ii	6	16	23·8883		viii	1	8	43·2223	
iii	7	25	7·1106		ix	2	17	26·4446	
iv	8	33	50·3329		x	3	26	9·6669	
v	9	42	33·5552		xi	4	34	52·8892	
vi	10	51	16·7775		xii	5	43	36·1115	
				1 Hour of Night,		6	52	19·334	P. M. May 31.

		h.	m.	s.
Mir. at Jerusalem, m. t.	May 31	18	0	0·0
Meridians		+ 1	12	35
At Persepolis, m. t.	May 31	19	12	35
Equation of t.		+	9	31·3
In app. t.	May 31	19	22	6·3
1st h. of night.	May 31	18	52	19·334
Date of miracle in the 1st h. of n.	at ..	..	29	46·966

		h.	m.	s.
Mir. at Persepolis, app. t.	May 31	19	22	6·3
		− 12		
Restitution,	May 31	7	22	6·3
		+	3	0·8
Third hour,	May 31	7	25	7·1

It appears then that, if the latitude and longitude of the ancient

Persepolis, as we have assumed them *supra*, on the authority of D'Anville, can be depended on, the miracle happened there 29 m. 47 sec. after the beginning of the first hour of night; and diurnal time was restored only 3 m. 0·8 sec. before the third hour of day. It is clear therefore that, whatsoever service had begun at 18 h. 52 m. 19·334 sec. the first hour of night, it would have to be continued at 7 h. 22 m. 6·3 sec. = 7 h. 25 m. 7·1 sec: i. e. at the third hour of day. And this would virtually imply that it had begun at sunrise, 5 h. 7 m. 40·7 sec. before; i. e. at the first hour of day. It is easy to see that, under such circumstances, the rule of the cycle, for liturgical or religious purposes, must thenceforward be changed. It must be reckoned ever after from sunrise, not from sunset; as it appears to have actually been.

vi. Calculation of sunset May 31, B.C. 710, for the latitude of Babylon. Vol. i. 351.

	°	′	″		h.	m.	s.	
SL′ =	60	45	4	May 31	18	48	4	mean time. Approximate sunset.
ω =	23	47	1					
L =	33	19	50. N.					

			°	′	″		
i. Log. sine of SL′	=	Log. sine of	60	45	4	=	9·940 768 1
+ Log. sine of ω	=	Log. sine of	23	47	1	=	+ 9·605 610 5
Log. sine of D		(Log. sine of	20	36	6)	=	9·546 378 6
ii. Log. tang. of D	=	Log. tang. of	20	36	6	=	.. 9·575 082 1
+ Log. tang. of L′	=	Log. tang. of	33	19	50	=	+ 9·817 988 8
Log. cos. of SNA ..		(Log. cos. of	75	41	14)	=	.. 9·393 070 9

Seminocturnal arc .. .. 5 h. 2 m. 44·933 3 sec.

		h.	m.	s.	
True sunset	May 31	6	57	15·066 7	P.M. App. t.
App. sunset	May 31	6	59	27·066 7	P.M. App. t.
True sunrise	May 31	5	2	44·933 3	A.M. App. t.
App. sunrise	May 31	5	0	32·933 3	A.M. App. t.

Diurnal hour, ... 1 h. 9 m. 54·511 11

Ὧραι καιρικαὶ, from sunrise to sunset May 31, B.C. 710, for the latitude of Babylon.

Hours.	h.	m.	s.		Hours.	h.	m.	s.	
i	5	0	32·933 3	A.M. May 31.	vii	12	0	0·000 0	P.M. May 31.
ii	6	10	27·444 41		viii	1	9	54·511 11	
iii	7	20	21·955 52		ix	2	19	49·022 22	
iv	8	30	16·466 63		x	3	29	43·533 33	
v	9	40	10·977 74		xi	4	39	38·044 44	
vi	10	50	5·488 85		xii	5	49	32·555 55	

1 Hour of Night .. .. .. 6 59 27·066 7 P.M. May 31.

		h.	m.	s.			h.	m.	s.
Mir. at Jerusalem, m. t.	May 31	18	0	0·0	Mir. app. t.	May 31	18	46	6·2
		+	36	35			−	12	
At Babylon, m.t.	May 31	18	36	35	Restitution,	May 31	6	46	6·2
Equation of time ..		+	9	31·2	iid h. of day,	May 31	6	10	27·4
In app. t.	May 31	18	46	6·2	Restitution in the second hour, at			35	38·8
xiith h.	May 31	17	49	32·6					
Date of the miracle in the xiith hour at			56	33·6					

For this latitude then the miracle anticipated only 13 m. 21 sec. on the end of the xiith hour of day, i. e. sunset; and diurnal time was restored almost at the middle point of the second hour of day. It is possible that the meridian of the Chaldee observatory at this time was more to the east of that of Jerusalem than we have assumed it; which would bring the time of the miracle so much nearer to sunset, or the end of the current noctidiurnal cycle. But in any case, and for any purpose which required the reckoning of noctidiurnal time to be continued even after the miracle exactly as it was going on before it, there would be no alternative except to take up the second hour of the day, *de novo*, at 35 38.8 of its own reckoning; and this would amount to a change of style from sunset to sunrise; such as *de facto* must some time or other have been made at Babylon, and by the Chaldees, for astrological purposes at least.

vii. Calculation of sunset May 31 B. C. 710, for the latitude of Taxila. Vol. i. 353.

		°	′	″		h.	m.	s.	
SL′	=	60	41	25	May 31	19	0	30	mean time. Approximate sunset.
ω	=	23	47	1	..			..	
L	=	32	30	0.	N. D'Anville.				

	°	′	″		
i. Log. sine of SL′ = Log. sine of	60	41	25	=	9·940 509 6
+ Log. sine of ω = Log. sine of	23	47	1	=	+ 9·605 610 5
Log. sine of D (Log. sine of	20	35	19)	=	9·546 120 1

	°	′	″		
ii. Log. tang. of D = Log. tang. of	20	35	19	=	9·574 781 6
+ Log. tang. of L = Log. tang. of	32	30	0	=	+ 9·804 187 3
Log. cos. of SNA (Log. cos. of	76	9	14)	=	9·378 968 9

		h.	m.	s.	
Semi-nocturnal arc		5	4	36·933 3	
True sunset ..	May 31	6	55	23·066 7	P. M. App. t.
App. sunset ..	May 31	6	57	35·066 7	P. M. App. t.
True sunrise ..	May 31	5	4	36·933 3	A. M. App. t.
App. sunrise ..	May 31	5	2	24·933 3	A. M. App. t.
Diurnal hour ..	..	1	9	35·844 45	
Nocturnal hour ..	..		50	24·155 55	

Ὧραι καιρικαὶ, from sunrise to sunset May 31 B. C. 710, for the latitude of Taxila.

Hours.	h.	m.	s.		Hours.	h.	m.	s.	
i	5	2	24·933 3	A. M. May 31	vii	12	0	0.000 00	P. M. May 31
ii	6	12	0·777 75		viii	1	9	35·844 45	
iii	8	21	36·622 2		ix	2	19	11·688 9	
iv	9	31	12·466 65		x	3	28	47·533 35	
v	10	40	48·311 1		xi	4	38	23·377 8	
vi	11	50	24·155 55		xii	5	47	59·222 25	
				1 Hour of Night		6	57	35·066 7	P. M. May 31

		h.	m.	s.			h.	m.	s.
Miracle at Jer. m. t.	May 31	18	0	0	Mir. app. t.	May 31	20	30	6·4
	+	2	20	35		−	12		
At Taxila, m. t.	May 31	20	20	35	Restitution,	May 31	8	30	6·4
Equation of t.	+		9	31·4	iiid hour		8	21	36·6
App. time	May 31	20	30	6·4	Restitution in the third h.	at 8m. 29·8 sec.			
Second h. of night	May 31	19	47	59·2					
Date of miracle in the secd. h. of N.			42	7·2					

If then the latitude and longitude of Taxila here assumed may be depended on, the miracle happened there at 42 m. 7 sec. in the second hour of night; and diurnal time was restored at 8 m. 30 sec. in the third hour of day. In this case then the reckoning must go on (for any purpose which required every thing to be continued as before, yet in the period of 24 hours) as if *in* the third hour of day, and as if *from* sunrise; and that would amount to a change of the rule ever after, for such purposes as these. But for general purposes, there is no reason why we should not suppose the reckoning of the cycle to be resumed and continued at the third hour of day indeed, but as if dated afresh from sunset the day before; i. e. as if there had been no interruption in the reckoning, but every thing had gone on as usual.

viii. Calculation of sunset May 31 B. C. 710 for the latitude of Palibothra. Vol. i. 353.

		°	′	″		h.	m.	s.	
S L′	=	60	38	52	May 31	18	40	30	mean time. Approximate sunset
ω	=	23	47	1					
L	=	26	0	0.	N. D'Anville				

		°	′	″		
i. Log. sine of S L′	= Log. sine of	60	38	52	=	9·940 328 6
+ Log. sine of ω	= Log. sine of	23	47	1	=	+ 9·605 610 5
Log. sine of D (Log. sine of		20	34	47)	=	9·545 939 1

		°	′	″		
ii. Log. tang. of D	= Log. tang. of	20	34	47	=	9·574 576 9
+ Log. tang. of L	= Log. tang. of	26	0	0	=	+ 9·688 181 8
Log. cos. of S N A (Log. cos. of		79	26	52)	=	9·262 758 7

		h.	m.	s.	
Semi-nocturnal arc		5	17	47·466 6	
True sunset ..	May 31	6	42	12·533 4	P. M. App. t.
App. sunset ..	May 31	6	44	24·533 4	P. M. App. t.
True sunrise ..	May 31	5	17	47·466 6	A. M. App. t.
App. sunrise ..	May 32	5	15	35·466 6	A. M. App. t.
Diurnal hour, ..	..	1	7	24·088 9	
Nocturnal hour, ..	..		52	35·911 1	

Ὧραι καιρικαὶ, from sunrise to sunset May 31 B. C. 710, for the latitude of Palibothra: and from sunset to midnight June 1.

Hours of day.	h.	m.	s.		Hours of night.	h.	m.	s.	
i	5	15	35·466 6	A. M. May 31	i	6	44	24·533 4	P. M. May 31
ii	6	22	59·555 5		ii	7	37	0·444 5	
iii	7	30	23·644 4		iii	8	29	36·355 6	
iv	8	37	47·733 3		iv	9	22	12·266 7	
v	9	45	11·822 2		v	10	14	48·177 8	
vi	10	52	35·911 1		vi	11	7	24·088 9	
vii	12	0	0·000 0		vii	12	0	0·000 0	P. M. June 1
viii	1	7	24·088 9						
ix	2	14	48·177 8						
x	3	22	12·266 7						
xi	4	29	36·355 6						
xii	5	37	0·444 5						

		h.	m.	s.
Mir. at Jer. m. t.	May 31	18	0	0
		+ 3	4	35
At Palibothra m. t.	May 31	21	4	35
Equation of t.		+	9	32·6
Appt. t.	May 31	21	14	7·6
iiid hour of N.		20	29	36·4
Date of miracle in the third h. at			44	31·2

		h.	m.	s.
Mir. appt. t.	May 31	21	14	7·6
		− 12		
Restitution,	May 31	9	14	7·6
ivth h. of day		8	37	47·7
Restitution in the ivth h. at			36	19·9

For this latitude and longitude then, (if they can be depended on,) the miracle happened 44 m. 31 sec. past the third hour of night; and diurnal time was restored at 36 m. 20 sec. past the fourth hour of day. The nominal reckoning of the cycle might be resumed and continued, even under such circumstances, as if from sunset again the day before; but for religious services, (such as were probably in existence in India at this time[h],) it must proceed as if from sunrise May 31, at 5 h. 15 m. 35 sec.: and for such purposes sunrise must be the epoch of the cycle ever after.

ix. Calculation of sunset, May 31, B. C. 710, for the latitude of Bénares. Vol. i. 352.

SL′ = 60° 38′ 16″ May 31 18h. 31m. 38s. mean time. Approximate sunset.
ω = 23 47 1
L = 25 18 33. N.

i.	Log. sine of SL′ =	Log. sine of 60° 38′ 16″ =	9·940 286 0
	+ Log. sine of ω =	Log. sine of 23 47 1 =	+ 9·605 610 5
	Log. sine of D	(Log. sine of 20 34 40) =	9·545 896 5
ii.	Log. tang. of D =	Log. tang. of 20° 34′ 40″ =	9·574 532 1
	+ Log. tang. of L =	Log. tang. of 25 18 33 =	+ 9·674 763 4
	Log. cos. of SNA	(Log. cos. of 79 46 25) =	9·249 295 5

		h.	m.	s.	
Seminocturnal arc..	..	5	19	5·666	
True sunset,	May 31	6	40	54·334	P. M. App. t.
App. sunset,	May 31	6	43	6·334	P. M. App. t.
True sunrise,	May 31	5	19	5·666	A. M. App. t.
App. sunrise,	May 31	5	16	53·666	A. M. App. t.
Diurnal hour ..	..	1	7	11·055 6	
Nocturnal hour..	..	0	52	48·944 3	

῾Ωραι καιρικαὶ, from sunrise to sunset May 31 B. C. 710, and from sunset May 31 to midnight June 1; for the latitude of Bénares.

Hours of day.	h.	m.	s.		Hours of night.	h.	m.	s.	
i	5	16	53·666	A. M. May 31	i	6	43	6·334	P. M. May 31
ii	6	24	4·721 6		ii	7	35	55·278 3	
iii	7	31	15·777 2		iii	8	28	44·222 6	
iv	8	38	26·832 8		iv	9	21	33·166 9	
v	9	45	37·888 4		v	10	14	22·111 2	
vi	10	52	48·944		vi	11	7	11·055 5	
vii	12	0	0·000 0	P. M.	vii	12	0	0·0	
viii	1	7	11·055 6						
ix	2	14	22·111 2						
x	3	21	33·166 8						
xi	4	28	44·222 4						
xii	5	35	55·278						

h See supra, p. 60, Diss. xv. ch. xii. sect. viii. note.

		h.	m.	s.
Mir. m. t. at Jerusalem,	May 31	18	0	0
	+	3	10	57
At Bénares, mean time,	May 31	21	10	57
Equation of time,	+		9	31·6
App. time,	May 31	21	20	28.6
iiird h. of night,		20	28	44·2
Mir. in the iiird hour,	at		51	44·4
	+		1	4·5
Nocturnal hour,			52	48·9

		h.	m.	s.
Miracle,	May 31	21	20	28.6
	−	12		
Restitution,	May 31	9	20	28·6
ivth hour of day,		8	38	26·8
Restitution in the ivth h.	at		42	1·8

For this latitude and longitude consequently the article of the miracle was only 1 m. 4·5 sec. before the end of the third hour of night; and diurnal time was restored at 42 m. 1·8 sec. past the fourth hour of day. Under these circumstances, the fourth hour of night would readily pass into the fourth of day, and the epoch of the reckoning thenceforward (for peculiar purposes as before) would be sunrise, not sunset. And yet for common use and common purposes it might continue to be sunset still.

x. Calculation of sunrise May 31 B. C. 710, for the latitude of Mexico. Vol. i. 363.

$SL' = 60^\circ\ 35'\ 45''$ May 31 5h. 20m. 12s. mean time. Approximate sunrise.
$\omega = 23\ 47\ 1$
$L = 19\ 25\ 45$. N.

i. Log. sine of SL′ = Log. sine of $60^\circ\ 35'\ 45''$ = 9·940 1070
+ Log. sine of ω = Log. sine of 23 47 1 = +9·605 6105

Log. sine of D (Log. sine of 20 34 8) = 9·545 7175

ii. Log. tang. of D = Log. tang. of $20^\circ\ 34'\ 8''$ = 9·574 3273
+ Log. tang. of L = Log. tang. of 19 25 45 = +9·547 4398

Log. cos. SNA (Log. cos. 82 23 38) = 9·121 7671

		h.	m.	s.	
Seminocturnal arc..	..	5	29	34·5333	
True sunrise,	May 31	5	29	34·5333	A. M. App. t.
App. sunrise,	May 31	5	27	22·5333	App. t.
Diurnal hour ..	..	1	5	26·24445	
App. sunset,	May 31	6	32	37·4667	App. t.
Nocturnal hour..	..	0	54	33·75555	

Ὧραι καιρικαὶ from sunset May 30 to noon May 31 B. C. 710.

Hours.	h.	m.	s.		Hours.	h.	m.	s.	
i	6	32	37·4667	P. M. May 30	i	5	27	22·5333	A. M. May 31
ii	7	27	11·22225		ii	6	32	48·77775	
iii	8	21	44·9778		iii	7	38	15·0222	
iv	9	16	18·73335		iv	8	43	41·26665	
v	10	10	52·4889		v	9	49	7·5111	
vi	11	5	26·24445		vi	10	54	33·75555	
vii	12	0	0·0000	A. M. May 31	vii	12	0	0	
viii	0	54	33·75555						
ix	1	49	7·5111						
x	2	43	41·26665						
xi	3	38	15·0222						
xii	4	32	48·77775						

		h.	m.	s.
Mir. at Jerusalem, m. t.	May 31	18	0	0
		−8	57	7
At Mexico, mean time,	May 31	9	2	53
Equation of time,			+9	31·7
App. time,	May 31	9	12	24·7
ivth hour,	..	8	43	41·3
Miracle in the ivth hour, at			28	43·4

		h.	m.	s.
Mir. app. t.	May 31	9	12	24.7
		−12		
Restitution,	May 30	21	12	24·7
iiird hour of night,		20	21	45
			50	39·7
Date of the Restitution before the ivth hour of night.			+3	54
			54	33·7

For this latitude and this meridian consequently the date of the miracle was 28 m. 43 sec. past the ivth hour of day May 31; and nocturnal time was restored at 50 m. 39·7 sec. past the third hour of night; only 3 m. 54 sec. before the end of that and the beginning of the next. It does not appear therefore that the effect in this instance could have been to change the epoch of the noctidiurnal cycle, or period of 24 hours, from sunset to sunrise: or to any thing different from what it was before. But it might be to lead to the introduction of the peculiar rule of the Aztecs; that of dividing the cycle into 8 equal parts, each of them three hours long. This division would seem to be made by the article of the restitution itself; coinciding so critically as it did with the end of the third hour of the cycle, and the beginning of the fourth. In other instances, it might be as near to the end of the fourth; and so give occasion to another rule also among the people of this part of the world, that of dividing the noctidiurnal cycle into six equal parts, each 4 hours long. It is very desirable too, as we observed before, that the place of the Pleiads at this time, and the date of their passage of the meridian for

these quarters, should be calculated; in order to ascertain whether it was not very near the time of the miracle itself.

xi. Calculation of sunrise, May 31 B. C. 710, for the latitude of Rome. Vol. i. 356.

S L′ = 60° 6′ 20″	May 31	4h. 31m. 8s.	mean time. Approximate sunrise.
ω = 23 47 1			
L = 41 54 8. N.			

i. Log. sine of S L′	=	Log. sine of 60° 6′ 20″ =	9·937 991 6
+ Log. sine of ω	=	Log. sine of 23 47 1 =	+ 9·605 610 5
Log. sine of D		(Log. sine 20 27 52) =	9·543 602 1

ii. Log. tang. of D	=	Log. tang of 20° 27′ 52″ =	9·571 915 5
+ Log. tang. of L	=	Log. tang of 41 54 8 =	+ 9·952 946 7
Log. cos. of S N A		(Log. cos. of 70 26 10) =	9·524 862 2

		h. m. s.	
Seminoctidiurnal arc		4 41 44·666	
True sunrise,	May 31	4 41 44·666	App. t.
App. sunrise,	May 31	4 39 32·666	App. t.
Diurnal hour,		1 13 24·555 6	

Ὧραι καιρικαὶ from sunrise to sunset, May 31 B. C. 710, for the latitude of Rome.

Hours.	h. m. s.		Hours.	h. m. s.	
i	4 39 32·666	A. M. May 31.	vii	12 0 0·000	P. M. May 31.
ii	5 52 57·221 6		viii	1 13 24·555 6	
iii	7 6 21·777 2		ix	2 26 49·111 2	
iv	8 19 46·332 8		x	3 40 13·666 8	
v	9 33 10·888 4		xi	4 53 38·222 4	
vi	10 46 35·444		xii	6 7 2·777 8	

ist Hour of Night. 7 20 27·334 P. M.

		h. m. s.
Mir. at Jeru. mean time.	May 31	18 0 0
		− 1 30 58
At Rome, m. t.	May 31	16 29 2
Equation of t.		+ 9 33·4
App. time,	May 31	16 38 35·4
xth hour,		15 40 13·7
Mir. in the xth hour,		58 21·7
		+ 15 2·9
Diurnal hour,	=	1 13 24·6

		h. m. s.
Mir. app. t.	May 31	16 38 35·4
		− 12
Restitution,	May 31	4 38 35·4
		+ 57·3
Sunrise or ist hour,	May 31	4 39 32·7

It is manifest then that for this latitude and this meridian the circumstances of the miracle were very peculiar. The precise date of the event was 58 m. 21·7 sec. past the xth hour; and only 15 m. 2·9 sec. before the point of the xith. And as 10 hours of kairic time at this season of the year for this latitude were equal to 12 of mean + 14 m. 5·556 sec.; (which was only 57·3 sec. less than 15 m. 2·9 sec.;) it would follow from this coincidence that diurnal time would be restored almost exactly at sunrise, or the first hour of day. The above scheme shews that the style was set back from May 31 16h. 38m. 35·4 sec. apparent time, to May 31 4h. 38m. 35·4 s. apparent time; only 57·3 sec. before the time of apparent sunrise, May 31 4h. 39m. 32·7 s. So that the effect of the miracle at Rome was to replace the sun almost exactly (and possibly even exactly) in the very same position, on the verge of the sensible horizon, in which it had been seen on the morning of the same day; 12 hours of mean time, 10 hours of kairic time, before *.

Under these circumstances, if it was the rule at Rome, as it was every where else, before this anomaly occurred, to reckon the nocti-diurnal cycle from sunset to sunset; midnight was now the middle point exactly between sunset May 30 and sunset, May 31, in the form of sunrise the same day which it had just assumed. To go back to sunset May 30, (an epoch nearly 24 hours past,) might appear to be contrary to the reason of things; and to continue the style of sunset May 31 in the form of sunrise May 31 might appear to be almost equally objectionable. But no such objection would apply to the point of midnight, or at least not to the same extent: and in defect of the other two, midnight, the middle point between them, would seem to be the only one which could be fixed upon in their stead.

Besides this, it is to be considered that the true cause of the recent extraordinary event, the retrogradation of the sun from west to east, or the sudden reversal of the style of the day from sunset to sunrise, could not possibly be known, nor even conjectured, out of Judæa; and it must be attributed every where else, by all who reflected or reasoned upon it, to some unknown, yet still natural and necessary, cause: which in the course of time might be expected to produce the same effect again. It might appear to be a probable expectation,

* The constant of refraction, which we have assumed is 33′ = 2 m. 12 s. in time. But we might have assumed it at 35′·6 (see Mr. Baily's Tables and Formulæ, p. 24) = 2 m. 22·4 sec. This would make a difference of 10 sec. in the time of sunrise: which on this principle would be 4 h. 39 m. 22·266 sec. A. M: only 46·9 sec. later than the article of the restitution.

justified by the experience of what had happened, that for some reason or other the noctidiurnal cycle would be set back at stated times (as it had just been) from sunset to sunrise, and from sunrise to sunset; under which circumstances, the most convenient mode of reckoning it, and the least likely to be affected by such a cycle of changes, would be from midnight to midnight, or from noon to noon: or at least alternately, from midnight after one such change as this from sunset to sunrise; and from noon after the next: if any thing of the same kind again took place.

It appears to us that this is the most probable explanation of the change of the rule of the noctidiurnal cycle at Rome. Some of the neighbours of Numa, from such considerations as these, might fix upon noon; but Numa himself fixed on midnight: which, under the circumstances of the case, was more in accordance with the pre-existing rule than noon. And yet these very considerations must render it extremely probable also that the object and effect of the change, so occasioned and so introduced, would be confined at the time to the services of religion; and would not affect even the legal day at first: much less the rule and observance of common life; which would be left to reckon the cycle as it had always done before.

It is therefore far from improbable that we owe to the second miracle of Scripture even the first introduction of the proper Julian rule of the noctidiurnal cycle; and that, if this had never occurred, the cycle of day and night at Rome at least would never have begun to be reckoned from midnight. And as nothing of this kind can be considered accidental; we may venture to say, (perhaps without presuming to be wise beyond what is written,) that, among the other effects and purposes which the Divine Providence contemplated in the work of this day, one and possibly not the least important was the introduction of this peculiar rule of the noctidiurnal cycle, which we understand by the Julian, at Rome. The Julian cycle of leap-year and the Julian correction of the calendar appear to have been so contemplated, and from all eternity[i]; and if these, the Julian rule of the noctidiurnal cycle also, which has been *de facto* always associated with them.

xii. Calculation of sunset May 31 B. C. 710, for the latitude of Caifongfou in China. Vol. i. 375.

		°	′	″		h.	m.	s.	
SL'	=	60	34	2	May 31	18	51	27	mean time. Approximate sunset.
ω	=	23	47	1					
L	=	34	52	0. N.					

i Vol ii. 45. Diss. ix. ch. ii. sect. ii.

i. Log. sine of S L′ = Log. sine of	60° 34′ 2″	=	9·939 984 7
+ Log. sine of ω = Log. sine of	23 47 1	=	+ 9·605 610 5
Log. sine of D (Log. sine of	20 33 46)	=	9·545 595 2

ii. Log. tang. of D = Log. tang. of	20° 33′ 46″	=	9·574 186 5
+ Log. tang. of L = Log. tang. of	34 52 0	=	+ 9·843 073 9
Log. cos. SNA (Log. cos. of	74 50 54)	=	9·417 260 4

		h.	m.	s.	
Semi-nocturnal arc		4	59	23·6	
True sunset ..	May 31	7	0	36·4	App. t.
Appt. sunset ..	May 31	7	2	48·4	App. t.
Nocturnal hour	..		49	31·933 3	
True sunrise ..	May 31	4	59	23·6	App. t.
Appt. sunrise ..	May 31	4	57	11·6	App. t.
Diurnal hour, ..	..	1	10	28·066 6	App. t.

῾Ωραι καιρικαὶ from sunrise May 31 to midnight June 1, B. C. 710, for the latitude of Caifongfou.

Hours.	h.	m.	s.		Hours.	h.	m.	s.	
i	4	57	11·6	A. M. May 31	i	7	2	48·4	P. M. May 31
ii	6	7	39·666 6		ii	7	52	20·333 3	
iii	7	18	7·733 2		iii	8	41	52·266 6	
iv	8	28	35·799 8		iv	9	31	24·199 9	
v	9	39	3·866 4		v	10	20	56·133 2	
vi	10	49	31·933		vi	11	10	28·066 5	
vii	12	0	0·000	P. M.	vii	11	59	59·999 8	
viii	1	10	28·066 6		=	12	0	0 0	A. M. June 1
ix	2	20	56·133 2						
x	3	31	24·199 8						
xi	4	41	52·266 4						
xii	5	52	20·333						

		h.	m.	s.
Mir. at Jer. m. t.	May 31	18	0	0
	+	5	16	56
At Caifongfou, m. t.	May 31	23	16	56
Equation of time,		+	9	31·9
Appt. time	May 31	23	26	27·9
vith hour of night		23	10	28·1
Mir. in the vith h. at			15	59·8
One Ke			14	24
Defect			1	35·8
		=	1	36

		h.	m.	s.
Mir. app. t.	May 31	23	26	27·9
		− 12		
Restitution	May 31	11	26	27·9
vith hour		10	49	31·9
Restitution, in the vith hour,			36	56·0

For this latitude therefore and this meridian the miracle took place May 31, 23h. 26m. 28s. apparent time; only 33m. 32s. before midnight: and diurnal time was restored at 11h. 26m. 28s.; only 33m. 32s. before noon. Now no one can deny that this coincidence would be competent to lay a foundation for the peculiar rule of the Chinese reckoning of the noctidiurnal cycle; viz. one hour before midnight. Instead of continuing the reckoning from sunset May 30 afresh, or from sunrise May 31, it might obviously be determined, in consequence of what had just happened, to continue the reckoning from the interruption itself; that is, to make the moment of the interruption the epoch of a new reckoning from that time forward.

But the coincidence is calculated to do more than this. It is competent to explain the most characteristic circumstance of the Chinese rule, yet the most inexplicable of all without some such reason as this; viz. that of dividing the period of 24 hours into 100 Ke, each of them equal to 14m. 24s. of mean or apparent time. Now this division appears to have been made at Caifongfou in particular by the miracle itself. The miracle itself, for this latitude, cut off the first ke of the first period of 24 hours, reckoned according to the new rule. For even by our calculation (which cannot be rigorously exact) it happened just 15m. 59·8s. past the point of the vith hour; and that was only 1m. 36s. more than one ke. Besides, as we argued before, though we may perhaps depend on the latitude of Caifongfou, assigned by Gaubil, the longitude must be a doubtful point. He assumes it at $2^\circ\ 3'\ 15''$ west of Pekin. Yet possibly it might be a few minutes more. Could we assume it at $2^\circ\ 27'$ exactly, then the miracle, for this latitude and this meridian, must have cut off 14m. 24s. exactly from the point of the vith hour of night. For $2^\circ\ 27' =$ 9m. 48s. We should have in that case,

		h.	m.	s.
Jerusalem and Pekin		+ 5	25	9
Pekin and Caifongfou			−9	48
Jerusalem and Caifongfou ..		+ 5	15	21
Miracle at Jerusalem mean time	May 31	18	0	0
		+ 5	15	21
At Caifongfou mean time	May 31	23	15	21
Equation of time		+	9	31·9
Apparent time ..	May 31	23	24	52·9
vith hour of night		23	10	28·1
Miracle in the vith hour			14	24·8
One ke			14	24
			0	0·8

xiii. Calculation of sunset May 31 B.C. 710, for the latitude of Pekin in China. Vol. i. 380.

		°	′	″		h.	m.	s.	
SL′	=	60	34	13	May 31	19	4	0·5	mean time. Approximate sunset.
ω	=	23	47	1					
L	=	39	54	13. N.					

i. Log. sine of SL′	= Log. sine of 60° 34′ 13″	=	9·939 997 7
+ Log. sine of ω	= Log. sine of 23 47 1	=	+9·605 610 5
Log sine of D	(Log. sine of 20 33 48)	=	9·545 608 2

ii. Log. tang. of D	= Log. tang. of 20° 33′ 48″	=	9·574 199 3
+ Log. tang. of L	= Log. tang. of 39 54 13	=	+9·922 329 3
Log. cos. SNA	(Log. cos. of 71 43 1)	=	9·496 528 6

		h.	m.	s.	
Seminocturnal arc	=	4	46	52·066 6	
True sunset	May 31	7	13	7·933 4	Apparent time.
Apparent sunset	May 31	7	15	19·933 4	Apparent time.
Nocturnal hour	..		47	26·677 76	
True sunrise	May 31	4	46	52·066 6	Apparent time.
Apparent sunrise	May 31	4	44	40·066 6	Apparent time.
Diurnal hour	..	1	12	33·322 23	

῟Ωραι καιρικαὶ from sunrise May 31 to midnight June 1, B.C. 710, for the latitude of Pekin.

Hours	h.	m.	s.	
i	4	44	40·066 6	A.M. May 31
ii	5	57	13·388 83	
iii	7	9	46·711 06	
iv	8	22	20·033 29	
v	9	34	53·355 52	
vi	10	47	26·677 75	
vii	12	0	0·000 0	P.M.
viii	1	12	33·322 23	
ix	2	25	6·644 46	
x	3	37	39·966 69	
xi	4	50	13·288 92	
xii	6	2	46·611 15	

Hours	h.	m.	s.	
i	7	15	19·933 4	P.M. May 31
ii	8	2	46·611 16	
iii	8	50	13·288 92	
iv	9	37	39·966 68	
v	10	25	6·644 44	
vi	11	12	33·322 20	
vii	11	59	59·999 96	
=	12	0	0	A.M. June 1

		h.	m.	s.
Mir. at Jerus. m. t.	May 31	18	0	0
		+5	25	9
At Pekin, mn. time,	May 31	23	25	9
Equation of time,			+9	31·8
Apparent time,	May 31	23	34	40·8
vith hour of night,		23	12	33·3
Miracle in the vith hour at			22	7·5
One ke,			14	24
Defect,			7	43·5

		h.	m.	s.
Mir. app. t.	May 31	23	34	40·8
		−12		
Restitution,	May 31	11	34	40·8
vith hour of day		10	47	26·7
Restitution, in vith h.			47	14·1

It does not appear then that, for this meridian and this latitude in particular, either of those remarkable coincidences, into which we have resolved the first introduction of the peculiar Chinese rule of the cycle and of the division of the cycle, could have held good. We must infer therefore that if these changes were made, in consequence of the miracle indeed, but because those very changes held good of some proper meridian of sufficient importance, at the time, it must have been of that of Caifongfou. Consequently Caifongfou not Pekin must have been the principal city of China at this time; at least the principal seat of learning and science in China, such as they were at this time. And this is evidently the point of view in which Gaubil regarded it at this time.

With regard however to the eclipse of Hi and Ho, (the real explanation of which is to be derived from the fact of the miracle, the circumstances under which it happened in China, and the impression which it produced in that country[k],) the traditionary particulars of that eclipse upon examination appear to have been all adapted to the meridian and the latitude of Pekin; from which coincidence we may reasonably infer that they are all of later date than the miracle itself, and are such as the Chinese of after-times either found them to be or represented them to be; but for *this meridian* and for *this latitude.* And yet it is another characteristic of these particulars, traditionary as they are, that for the meridian of Pekin they are such as to hold good of the true year of the miracle, B. C. 710; from which fact too it must be an obvious inference that, to howsoever remote an antiquity the Chinese of later times may have set back the date of this eclipse, it must long have been known and understood in that country that its true year was B. C. 710: as it could not fail to be, if this eclipse was after all only the miracle of the time of Hezekiah, mistaken or misrepresented as a phenomenon of the same kind in general. *This* at least and *this* only is the year to which, as we have seen, it is determined by the testimony of the Tchun-tsieou, and by the sexagesimal character of May 31, the day of the event, that year[l].

For first, according to some accounts of this eclipse received in China, it happened at noon for the meridian and latitude of Pekin[m]; and as the scheme of kairic hours, proposed above, shews, the article of the restitution at Pekin must actually have been only 25 m. 19 sec. before apparent noon: a circumstance of the event easy to be remembered, and likely to be so; and as likely to be represented in the course of time as noon.

[k] Fasti, vol. i. Diss. v. ch. iv. sect. xii. 377 sq.
[l] i. Diss. v. ch. iv. sect. x. p. 365 sqq.
[m] Ibid. p. 380.

ii. According to the oldest account of the miracle, that of the Chou-king[n], (some versions at least of the Chou-king in China,) the eclipse must have been dated at the 7th or 8th hour; which being reckoned from 11 P.M. of our time, agreeably to the Chinese rule, would correspond to 7 A.M. or nearly so. Now, for the meridian of Jerusalem, the actual date of the second new moon in May was

		h.	m.	s.	
	May 31	1	33	47·3	Mean time.
Add for the difference of meridians		5	25	9	
Actual date at Pekin	May 31	6	58	56·3	Mean time.
Equation of time ..		+	9	31·8	
	May 31	7	8	28·1	App. time.

The true date indeed in mean or apparent time for the meridian of Pekin or for any other might be somewhat later than this. But this is sufficient to shew that if this traditionary date of the eclipse in the time of the day, which professed to rest on the authority of the Chou-king, had any foundation in point of fact, it must have been that of the true date of the nearest new moon to the miracle; that of May 31, for the meridian of Pekin: and of course only in this year, B.C. 710.

iii. In the order of the Calendar, in China, the eclipse in question is most commonly attached to the ninth moon; the Calendar itself being supposed to be that of Hia[o]: the first moon of which being the next before the vernal equinox, the ninth moon was necessarily one of the moons of autumn. The ultimate foundation for this assumption also was no doubt the authority of the Tchun-tsieou, which had dated the eclipse in question in the seventh moon of the Royal Calendar; the first of the moons of the autumn according to the rule of that Calendar[p]. As the ninth moon in the Calendar of Hia was generally to be found in October, this too is probably the reason why the learned and men of science among the Chinese have always been anxious to discover this eclipse in the Julian month of October; and why that, among the days in October to which they have sought to attach it, they have shewn a marked preference for those in the last decad of that month, from the 20th to the 30th or 31st[q]. But this was probably not the only reason for such a predilection. If the new moon of October, B. C. 710, for the meridian of Pekin, is calculated, it brings a singular coincidence to

[n] Vol. i. 380. cf. Delambre, Astronomie Ancienne, i. 353.

[o] Vol. ii. 91. Diss. ix. ch. iv. sect. vii.

[p] Vol. i. 368. 370: Diss. v. ch. iv. sect. x.

[q] Ibid. 379. 381.

light; so much so, that we consider it worth while to give the particulars of that calculation in detail, before we point it out.

xiv. Calculation of the new moon of October B. C. 710 for the meridian of Pekin in China. Fourth year of the cycle of Leap-year. Epoch, April 29 at 12 h. A. D. 1803. Interval, 2512 mean Julian years. Secular correction, 25·1 centuries. Mean V. E. B. C. 4004 to mean A. E. B. C. 710, 3294·5 mean tropical years.

		°	′	″		At Greenwich. h.	m.	s.	
i. S L		0	0	0·0	Mar. 30	20	58	10·6	B. C. 710
		+205	37	54·820	+208	15	1	49·4	
S L	=	205	37	54·820	Oct. 25	12			

		°	′	″		h.	m.	s.	
ii. M L (Cal.iv.p.562.)		2	40	44·700	April 29	12	0	0	B. C. 710
		+198	34	29·834	+179				
M L	=	201	15	14·534	Oct. 25	12			

		°	′	″		
iii. S L } S L iv. M L′ }	=	205	37	54·820	Oct. 25	12
−M L	=	−201	15	14·534		
D	=	+4	22	40·286		

	°	′	″		h.	m.	s.
D′ D″ D‴ D⁗ D′′′′′	0	21	14·245	T′ T″ T‴ T⁗ T′′′′′ =	0	38	40·961
D	= +4	22	40·286	T =	+7	58	26·397
D D′ D″ D‴ D⁗ D′′′′′ =	+4	43	54·531	T T′ T″ T‴ T⁗ T′′′′′ =	+8	37	7·358

		°	′	″				h.	m.	s.
S L	=	205	37	54·820	v. M T =	Oct.	25	12	0	0
D′ D″ D‴ D⁗ D′′′′′	= +		21	14·245	T T′ T″ T‴ T⁗ T′′′′′ +			8	37	7
S L′ = M L′	=	205	59	9·065	vi. M T′	Oct.	25	20	37	7

		°	′	″		h.	m.	s.	
vii. A L (Cal.iv.p.563.)		56	28	57·108	Mar. 30	20	58	10·6	
			+	35·318	+208	23	30		
A L′	=	56	29	32·426	Oct. 25	20	28	10·6	
viii. P L (Cal.iv.p.563)	=	20	54	16·397	April 29	12	0	0	B. C. 710
		+19	58	53·027	+179	8	37	7	
ix. P L′	=	40	53	9·424	Oct. 25	20	37	7	
x. N L (Cal.iv.p.563)	=	313	30	0·030	April 29	12	0	0	B. C. 710
		−9	29	52·388	+179	8	37	7	
xi. N L′	=	304	0	7·642	Oct. 25	20	37	7	

		°	′	″		s.	°	′
xii. S A	=	149	29	36·639	=	4	29	29·61065

xiii. M A	= 165° 5′ 59″·641	= 5s. 15° 5′ 59″·641	Per.
		= 11 15 5 59·641	Ap.

xiv. N D		261° 59′ 1″·423	= 8s. 21° 59′·0237
			h. m. s.
xv.	E Arg. SA	=	− 2 9 41·5
	E′ Arg. MA′ = MA − x	=	− 2 50 40·3
	E″ Arg. SA − MA′	=	− 1 13·9
	E‴ Arg. ND	=	+ 25
	E E′ E″ E‴	=	− 5 1 10·7

		h. m. s.	
xvi. MT′	=	Oct. 25 20 37 7	
E E′ E″ E‴		− 5 1 10·7	
MT″	=	Oct. 25 15 35 56·3	Mean time at Greenwich.
		+ 7 45 56	
MT‴	=	Oct. 25 23 21 52·3	Mean time at Pekin.

The result of this calculation then is,

	h. m. s.	
Mean new moon,	Oct. 25 20 37 7	Mean time at Greenwich.
	Oct. 26 4 23 3	Mean time at Pekin.
True new moon,	Oct. 25 15 35 56·3	Mean time at Greenwich.
	Oct. 25 23 21 52·3	Mean time at Pekin.

The equation of time was positive, at this time, and equal to 10 or 11 minutes or upwards; so that the date of this conjunction in apparent time for the meridian of Pekin would be Oct. 25, 23 m. 32 or 33 sec.: i. e. in terms of the noctidiurnal cycle, as nearly as possible the same with the date of the miracle, May 31, before, for the same meridian. For that was

	h. m. s.	
	May 31 23 34 41	Apparent time
And this was	Oct. 25 23 33	Apparent time also.

We would not indeed venture to say that the coincidence between these two things was critically such as it appears to have been from this conclusion; or that the Chinese would actually find it so, from their calculation also. But if the miracle really happened at 23 h. 34 m. in terms of the noctidiurnal cycle, for the meridian of Pekin; and the Chinese of after-times actually found a new moon, in the ninth month reckoned from the epoch of the calendar of Hia, the same year, (as they evidently might do,) at, or very near to, the same time in the noctidiurnal cycle, and for the same meridian; *that* would be reason sufficient why they should take it for granted that this must

have been the month and this the day of the famous eclipse of Hi and Ho.*

iv. Tradition represented this eclipse to have happened in Fang[r]. Fang, as we have seen, was the name of one of the Chinese mansions[s]; the limits of which, before B.C. 672, were Oct 14–27; after, Oct. 13–26. Oct. 25 comes between these terms in each case alike. It was also the name of one of their constellations, which has been ascertained[t]; and the longitude of which A.D. 1683 or 1700 is known. It may be worth our while to put this tradition too to the test of calculation, by endeavouring to find out whether the conjunction of Oct. 25 would actually happen in the constellation Fang or not; and this will give us an opportunity of correcting the calculation of the Autumnal equinox for the meridian of Pekin B. C. 710, which is slightly in error.

xv. Calculation of the ingress of the sun into Fang, B. C. 710, for the meridian of Pekin.

Longitude of Fang			238°	31′	0″	A. D. 1683
Precession			− 33	16	31·4	− 2392·5 Supplementary Tables, Tab. iii. P. i. ii.
Longitude			205	14	28·6	B. C. 710 mean A. E.
	=	6s.	25°	14′	28″·6	
Mean V. E.	March	31	4	44	6·6	B. C. 710 at Pekin
2 quarters		+ 182	14	54	25·2	
Mean A. E.	Sept.	29	19	38	31·8	
		+ 25	14	36	43·462 = 25° 14′ 28″.6	Sup. Tables, Tab. viii. Part i. ii.
Ingress of the sun into Fang	Oct.	25	10	15	15·3	By mean motion from the mean A. E.
			h.	m.	s.	
Mean A. E.	Sept.	29	19	38	31·8	
Eq. of the Centre		+ 1	13	19	25·3	
True A. E.	Oct.	1	8	57	57·1	
		+ 25	14	36	43·5	
Ingress into Fang	Oct.	26	23	34	40·6	By mean motion from the true A.E.

* And we may further infer from this fact that, whether the phenomenon of the miracle was an ordinary affection of the sun and the moon, reducible under the category of eclipses, or not; they very well knew its true time was near the point of midnight; and that it must be sought for there if any where.

r Vol. i. 380. Diss. v. ch. iv. sect. xii. s iii. 552. t Vol. i. 381: iv. 30.

		° ′ ″		h. m. s.
SL	=	180 0 0·0	Sept. 29	19 38 31·8
	+	25 14 28·6	+ 25	14 36 43·5
SL		205 14 28·6	Oct. 25	10 15 15·3
Eq. of the Centre		− 57 51·3		+ 23 28 44·4
SL′	=	204 16 37·3	Oct. 26	9 43 59·7

It appears then that the mean conjunction of the sun with Fang would take place

h. m. s.
Oct. 25 10 15 15·3 mean time
The true Oct. 26 9 43 59·7 mean time.

Both these dates come within the limits of Fang the mansion B. C. 710, Oct. 14–27: and the former was about as much earlier than the true lunar and solar conjunction, October 25, 23 h. 21 m. 52 sec. mean time, as the latter was later. It is very probable therefore that the actual ingress of the sun into Fang, or conjunction with Fang, was calculated by the Chinese of after-times so as to coincide with the new moon, October 25, 23 h. 21 m. 52 sec.; and it would appear to do so if the equation of the centre was assumed at somewhat more than half its real amount, 13 or 14 hours instead of 23. These are coincidences which would scarcely have been produced by chance. If there are any persons who are still disposed to put implicit faith in the Chinese accounts of such facts in their past history as these, we recommend them to their consideration, and we should be glad to see them explained.

CHAPTER V.

New or full moons calculated in the Fasti Catholici: and other calculations.

i. New moon of April B. C. 4004, for the meridian of the ancient Jerusalem. Second year of the cycle of leap-year. Epoch, April 29 at 12 h. A.D. 1801. Interval, 5804 mean Julian years. Secular correction, 58·04 centuries. Fasti, ii. 21. iv. 374. 396.

		h. m. s.	
i. SL. Tabular M. V. E.	April 24	23 48 50·4	B. C. 4004
Correction,		+ 11 9·6	
True mean V.E.	April 25	0 0 0·0	at Jerusalem
		− 2 20 47	
	April 24	21 39 13·0	at Greenwich
		+ 3 14 20 47	
	April 28	12 0 0	

		°	′	″		h.	m.	s.	
S L	=	0	0	0·0	April 24	21	39	13·0	
	+	3	32	46·061	+ 3	14	20	47	
S L	=	3	32	46·061	April 28	12	0	0	
ii. M L, Epoch		31	13	1·811	April 29	12	0	0	A.D. 1801
5804 y.	= −	27	38	51·077					−5804
		3	34	10·734					
Correction 58·04 C.	= +	8	58	57·233					
M L	=	12	33	7·967	April 29	12	0	0	B.C. 4004
	−	13	10	35·027	− 1				
M L	=	359	22	32·940	April 28	12			
iii. S L′ } S L	=	3	32	46·061					
iv. M L′ } − M L	−	359	22	32·940					
D	= +	4	10	13·121	April 28	12			
D′	=	0	18	43·041	T′ =	0	34	5·551	
D″	=		1	24·007	T″ =		2	33·014	
D‴	=			6·284	T‴ =			11·446	
D⁗	=			0·470	T⁗ =			0·857	
D′′′′′	=			0·035	T′′′′′ =			0·064	
D′D″D‴D⁗D′′′′′	=	0	20	13·837	T′T″T‴T⁗T′′′′′ =	0	36	50·932	
D	=	4	10	13·121	T =	7	35	45·481	
DD′D″D‴D⁗D′′′′′	=	4	30	26·958	TT′T″T‴T⁗T′′′′′ =	8	12	36·413	
S L	=	3	32	46·061	v. M T = April 28	12	0	0	
D′D″D‴D⁗D′′′′′	= +		20	13·837	T′T″T‴T⁗T′′′′′ = +	8	12	36	
S L′ = M L′	=	3	52	59·898	vi. M T′ = April 28	20	12	36	
vii. A L		0	0	0·0	April 24	21	39	13·0	
			+	0.669	+ 4 − 1				
A L′	=	0	0	0·669	April 28	20	39	13·0	
viii. P L, Epoch		280	39	4·766	April 29	12	0	0	A.D. 1801
−5804 y.	−	7	26	45·510					−5804
		273	12	19·256					
Correction, 58·04 C	= −	33	15	11·892					
P L	=	239	57	7·364	April 29	12	0	0	B.C. 4004
			− 6	41·056	− 1				
		239	50	26·308					

			°	′	″		h.	m.	s.	
	PL	=	239	50	26·308	April 28	12	0	0	
			+	2	17·194	+	8	12	36	
ix.	PL′	=	239	52	43·502	April 28	20	12	36	
x.	NL, Epoch		7	0	14·957	April 29	12	0	0	A.D. 1801
	−5804 y.		+298	59	34·895					−5804
			305	59	49·852					
	Corr. 58·04 C.	=−	5	29	52·204					
	NL	=	300	29	57·648	April 29	12	0	0	B.C. 4004
			+	3	10·636	− 1				
			300	33	8·284	April 28	12	0	0	
			−	1	5·213	+	8	12	36	
xi.	NL′	=	300	32	3·071	April 28	20	12	36	

			°	′	″		s.	°	′	″	
xii.	SL′	=	3	52	59·898						
	−AL′	=−	0	0	0·669						
	SA	=	3	52	59·229	=	0	3	52·987		
xiii.	ML	=	3	52	59·898						
	−PL′	=	−239	52	43·502						
	MA	=	124	0	16·396	=	4	4	0	16·396	Per.
						=	10	4	0	16·396	Ap.
xiv.	SL′	=	3	52	59·898						
	−NL′	=	−300	32	3·071						
	ND	=	63	20	56·827	=	2	3	20·947		

					h.	m.	s.
xv.	E	Arg. SA	=	−	0	16	37·961
	E′	Arg. MA=MA−x	=	−	8	27	24·834
	E″	Arg. SA−MA′	=	−		4	11·95
				−	8	48	14·745
	E‴	Arg. ND	=	+		1	17·3
	EE′E″E‴		=	−	8	46	57·445

				h.	m.	s.	
xvi.	MT′	=	April 28	20	12	36·0	
	EE′E″E‴	=	−	8	46	57·445	
	MT″	=	April 28	11	25	38·555	Mean time at Greenwich.
			+	2	20	47	
	MT‴	=	April 28	13	46	25·555	Mean time at Jerusalem.

The result of this calculation consequently is,

		h.	m.	s.	
Mean new moon,	April 28	20	12	36	Mean time at Greenwich.
	April 28	22	33	23	Mean time at Jerusalem.
True new moon,	April 28	11	25	38·555	Mean time at Greenwich.
	April 28	13	46	25·555	Mean time at Jerusalem.

The date of this primary conjunction then, (the conjunction of the Hexaëmeron), if our calculation may be depended on, must have been April 28 at 13 h. 46 m. 26 sec. from mean midnight, 1 h. 46 m. 26 sec. from mean noon, for the meridian of Jerusalem. And this approaches so near to the point of mean noon for that meridian, as to render it probable that the actual date of this primary conjunction and for the primary meridian was mean noon itself, in the local time of that meridian; the local time of which however, and true time, as measured by one period, the period of 24 hours of mean solar time, and as proceeding from one epoch the epoch of mean midnight, perpetually, were always one and the same. With respect to our own calculation; it cannot admit of a question that for so remote an epoch, as this of B. C. 4004, it must be more or less in error; and yet, if it is in error at all, it may be so in excess not in defect of the truth; i. e. it may shew the true new moon at last too late, rather than too early, in comparison of what it really must have been. The formulæ, for the correction of the mean lunar longitude of A. D. 1801 carried back to B. C. 4004, can serve that purpose, at so remote a point of time, only approximately, or within certain limits of the truth. It is agreed that other terms should enter these formulæ; one of which would contain the fourth power of κ: and though the coefficient of this term would necessarily be very small, yet its multiplier the fourth power of 58·04 centuries would be something great. As the second term in these formulæ, containing the third power of κ, serves to correct the first which contains the square of κ; perhaps this fourth term (if calculated) would serve to correct the second: and in whatsoever proportion it diminished this second term, which is negative, in the same it would add to the first, which is positive; though this is a point which we leave to the Astronomers to determine. Certain at least it is, that were the mean longitude of the moon in the preceding calculation (i. e. M L), at mean noon April 28, for the meridian of Greenwich, to be increased 30′ or 40′ merely, either by correcting the formula in its present state, or by introducing a third term into it along with the other two; it would bring out the true conjunction at last for the meridian of Jerusalem as nearly as possible at

mean noon: which every one must allow to be *a priori* as probable an epoch as any to which the *primary* lunar conjunction in connection with the existing system of things and for the *primary* meridian could be expected to have been attached.

The peculiar advantage of the method which we adopt in these calculations, as we observed on a former occasion[v], consists in the exactness with which it is calculated to recover the mean longitude of any former point of time from that of A. D. 1801; an exactness to which no limit is prescribed except by the nature of the data of which we make use, and by that of the formulæ for the secular correction. Could both these be depended on, howsoever far back they might be carried, we do not see what difference distance of time could make to the certainty of our conclusions. They must be as true for points of time the most remote from A. D. 1801, as for those which are the nearest to it. Nor can it be denied that, as it is, we have produced several remarkable proofs of their truth, at very distant points of time. The mean momenta of A. D. 1801 probably may be depended on: let us therefore endeavour to ascertain whether those which we have recovered for B. C. 4004 are entirely consistent with them. For this purpose, we will compare the mean new moon, April 28 B. C. 4004, as just determined, with that of March 21, A. D. 1802, which we calculated on a former occasion[x].

This year A. D. 1802 corresponds to Period xx Cycle ii *11 of our general Lunar Calendar: and the number of mean or actual lunar months between April 28 B. C. 4004 and March 21 A. D. 1802 stands as follows:

xix Periods of 3760 lunations	=	71 440 Lunations.
1 Cycle	=	235
8 Years	=	99
2 Years	=	24
Per. xx. Cycle ii. *11	=	71 798 Lunations.

The interval from April 28 B. C. 4004 at a given time to April 28 A. D. 1802 at the same time, 5805 mean Julian years, reduced to mean solar days and nights, was 2 120 276 d. 12 h.; but in integral days and nights, i. e. in 5805 actual Julian years, it was only 2 120 276. We have then,

	d.	h.	m.	s.
5805 Julian years, April 28 B. C. 4004 to April 28 A. D. 1802, Table xxxi.	2 120 276	0	0	0
71 798 Lunations of the standard of our Fasti, Table xxv.	2 120 236	22	47	14·043
Defect of the latter on the former,	39	1	12	45·957

v iii. 526. Diss. xv. ch. ix. sect. vii. x iii. 527. Cf. No. xv. infra.

		h.	m.	s.	
Consequently if we have the 1st Lunation, B. C. 4004,	April 28	20	12	36	at Greenwich.
	— 39	1	12	45·957	
We have the 71 799th A. D 1802,	March 20	18	59	50·043	at Gr. also.

The next step is to calculate the mean lunar standard of the middle period between B. C. 4004 and A. D. 1802; i. e. B. C. 1102. In this case we assume $\kappa = 29{\cdot}02$ centuries, and $\kappa^2 = 842{\cdot}1604$. We have then,

		s.
$+\ 0{\cdot}034136 \times \kappa$	$= +$	0·990 626 72
$-\ 0{\cdot}00009245 \times \kappa^2$	$= -$	0·077 857 728 98
Correction, 29·02 C=	$= +$	0·912 768 991 02

	d.	h.	m.	s.
Standard of A. D. 1801,	29	12	44	2·865 537 6
Correction, 29·02 C.				+ 0·912 768 991 02
Standard of B. C. 1102,	29	12	44	3·778 306 591 02
Standard of the Fasti,	29	12	44	2·553 191 489 36
Defect of the latter on the former,				1·225 115 101 66

Now this difference multiplied by 71 798 is found to = 87 960 sec. 814 068 984 68; i. e. 24 h. 26 m. 0·814 sec. And this is the amount of mean solar time by which the 71 799th lunation of the standard of our Fasti would anticipate on the 71 799th of the standard of B. C. 1102, the middle period between B. C. 4004 and A. D. 1802. We have then,

			h.	m.	s.
71 799th Lunation of the standard of the Fasti,	March 20		18	59	50·043
Anticipation,	+	1	0	26	0·814
71 799th of the standard of the middle period,	March 21		19	25	50·857
True mean new moon, of March, A. D. 1802,	March 21		18	49	23
Excess of the standard of the middle period,			0	36	27·857

We do not therefore attain to the true mean lunar time of A.D. 1802 from the equable or average standard of mean lunar time, between B. C. 4004 and A. D. 1802, recovered from formula, within 36 m. 28 seconds; which is a greater difference than ought to exist. This difference would disappear if the date of the mean conjunction, April 28 B. C. 4004, were 36 or 37 minutes earlier; every thing else remaining the same: in which case the mean longitude of the moon April 28 at mean noon must be proportionably greater too. And very possibly both the date of this mean conjunction may require to be set back, and the mean standard of the middle period, obtained from formula, may require to be increased too. But these

are points which it is proper to bring under the notice of the Astronomers; but to decide must belong to them. Without their sanction we can make no alteration in our calculations; which must stand exactly as we have given them.

The ancient Egyptians, as we have seen[y], attached the mean lunar time of their Phœnix period and cycle to the epoch of noon; possibly not merely because the true new moon of April B.C. 1847 happened to fall out very near the point of noon, but also because of a traditionary belief, still retained among them, that the true epoch of lunar time dated from the first was noon. Scaliger asserted[z] that all the nations of the east attached the epoch of their lunar computus, out of preference, to the point of noon. Be this as it may, it cannot be doubted that the actual date of the new moon of April, B. C. 4004, must have been the 28th day of that month, either at the point of noon, or near it, for the meridian of the ancient Jerusalem. Consequently it must have been the fourth day of the Hexaëmeron; the *feria quarta* of the week of the Mosaic creation. We were long indeed of opinion that it was the fifth day, April 29th; and we were still of that opinion when the question of its date was under discussion before[a]. But the truth compels us to renounce this opinion: and therefore to retract or to qualify some of the conclusions to which we came at that time also[a].

The position indeed which we were defending, and the same inference from the literal construction of the words of Scripture, viz. that the moon must have been more or less in possession of its proper light on the morning of the fourth day, and consequently must first have appeared in the state of the last phasis, will still hold good. If the sun and the moon were both made to appear on this morning, for the first time in the week of the Creation, at the usual time of sunrise; that could not be less than six hours of mean time before the conjunction, even though the conjunction took place exactly at noon: and six hours before the conjunction the moon must still turn more or less of the illuminated part of its surface towards our earth. The moon cannot be totally dark, relatively to the earth, until the absolute moment of the conjunction itself; when it stands between the earth and the sun in such a manner that the same right line would pass through the centre of each alike. Six hours before the conjunction it wants 3 or 4 degrees at least of that position. The moon therefore on physical principles must still be strictly in the state of the phasis 6 hours before the conjunction. And though no human

[y] iii. 509—517. [z] i. 217. Diss. iv. ch. ii. sect. xiv. [a] Vol. ii. 14—23. Diss. ix. ch. i. sect. v. vi.

eye could possibly discern any portion of the lunar light at that period of the synodic revolution; there are no doubt beings *in rerum natura*, and beings with eyes as well as men, who can. For ought which we know to the contrary, 6 hours before the conjunction may be the limit of the last phasis which nature has prescribed even for the perception of such beings as these. But when man was not yet in existence, (as on the morning of the fourth day of the Hexaëmeron,) it would be absurd to suppose that the *visibility* of the moon on this first occasion must have been adapted to *his* powers of perception. These are questions however on which we cannot be certain that it is proper for us to speculate at all, at present; but we may be certain that it is not necessary.

True mean lunar time then B.C. 4004 having begun to be current for the primary meridian on April 28, at 22 h. 33 m. 23 sec. from mean midnight, and true mean equinoctial time for the same meridian on April 25, at 0 h. 0 m. 21·6 sec; the latter anticipated 3 days, 22 h. 33 m. 1·4 sec. on the former. The mean lunar time of our Tables in Division D, as they stand at present, is attached to April 29 at 18 hours for the meridian of Jerusalem; but this is easily corrected by reading April 29 at mean midnight, for the same meridian, instead of April 29 at 18 hours. And on mean midnight April 29 the mean equinoctial time of our Tables, properly corrected, anticipated 3 d. 23 h. 59 m. 38·4 sec.

		d.	h.	m.	s.	
Primary mean V. E.	April 25		0	0	21·6	B. C. 4004.
	+	3	23	59	38·4	
Primary mean Conj.	April 29		0	0	0	B. C 4004.

And this difference of origination must continue to exist between them ever after, in addition to any other which might be generated over and above it, by the decursus of each from this time forward along with the other, in obedience to its proper law.

Now the mean lunar time of our Tables falls back on the mean Julian, as we have often explained, 24 hours exactly in 304 years. The mean equinoctial falls back on the mean Julian in 304 years, 2 days 8 h. 32 m. 38·4 sec.

	d.	h.	m.	s.
Table xxxi, 304 mean Julian years =	111 036	0	0	0
Table xxx, 304 mean tropical =	111 033	15	27	21·6
	2	8	32	38·4

The mean equinoctial time of our Tables then must recede on the mean lunar at the rate of 1 d. 8 h. 32 m. 38·4 sec. every 304 years;

i. e. 1·356 d. every Period. In xix Periods therefore it ought to be found to have fallen back 1·356 d. × 19, or 25 d. 18 h. 20 m. 9·6 sec. on the first lunar term of Period xx, (April 10 A. D. 1773,) over and above the standing difference of origination, 3 d. 23 h. 59 m. 38·4 sec. It is easy to shew that it is so found.

		d.	h.	m.	s.
Recession of Equinoctial on lunar time, in 19 Periods		25	18	20	9·6
Difference of origination	+	3	23	59	38·4
Total difference at the Ingress of Period xx.		29	18	19	48

			h.	m.	s.	
Tabular mean V. E.	March	9	5	28	40·8	A. D. 1773
Correction	+	2	0	11	31·2	
True mean V. E. ..	March	11	5	40	12·0	
Recession of Equinoctial on Lunar time, at the Ingress of Period xx	+	29	18	19	48	
First lunar term of Period xx	April	10	0	0	0	

The mean lunar time of our Tables then and true mean lunar time for any meridian B. C. 4004 must have been nearly coincident. A. D. 1802, as we have seen, the difference between it and the true for a given meridian was almost a day exactly. We had the

			h.	m.	s.
71 799th Lunation of the Standard of the Fasti,	March	20	18	59	50·043
And the true mean new moon, A. D. 1802,	March	21	18	49	23
Defect of the former	=		23	49	32·957

Only 10 m. 27·043 less than 24 hours exactly. And that this was the actual relation of our mean lunar time and the true A. D. 1836–37 will appear from the comparison instituted between them for that year in the Introduction to the Tables[b]. It follows that the mean lunar dates of our Tables, obtained in the manner explained elsewhere[c], by being merely raised one day in terms are competent to represent the true mean dates of the same kind from the beginning to the end of the present century.

On this subject however it is most important to observe that the date of the true conjunction in the week of the Hexaëmeron for the primary meridian having been April 28 at or after mean noon on the feria *quarta;* that moon was one day old complete April 29 at or

[b] P. 101, 103. Part ii. ch. i. sect. xi. ch. ii. sect. i.

[c] Introduction, 91—102. Part ii. ch. i. sect. vii—xi: 226. Part iii. ch. i. sect. xii.

after mean noon, on the feria *quinta:* two days old at or after mean noon April 30, on the feria *sexta;* three days old at or after mean noon May 1, on the feria *septima;* and 3 days old complete at or about sunset, May 1, the ingress of the feria *prima,* according to the primitive rule, in the first week after the Creation.

We should consider it idle and useless, if not presumptuous, to enter here on any speculations concerning the climate of Eden or the climate of Paradise; or at what period of the lunar revolution from conjunction to conjunction the first or the last phasis might be supposed to have taken place for such a climate as that. Whether there was any thing peculiar to the air and climate of Paradise, or whether there was not, more than is so to the same quarter of the earth, and to its proper climate, at present; we cannot doubt that the moon of the Hexaëmeron must already have become visible three days at least after the conjunction. And as Mundane time, strictly speaking, (the time of this world, when it was now complete, and fitted in all respects for the habitation and existence of mankind, destined thenceforward to occupy it,) must bear date rather from the *first* week *after* the Creation than from the week *of* the Creation itself; it would be altogether reasonable *a priori* to conclude that even though the moon was first in a state of conjunction with the sun at noon or at sunset, on the fourth day of the Hexaëmeron, yet lunar time, as part of mundane and human time, would begin to be reckoned from the *first* day of the week *after* the Creation, and according to the Primitive rule of the cycle of day and night, from sunset. If so, from May 1 at 18 hours, the feria *prima* also. And if on May 1 at 18 hours, then from the phasis, and not from the conjunction; and from a certain state of the phasis later than the phasis *prima,* and possibly as late as the phasis *tertia,* though not as the *quarta.*

Now that this must actually have been the case, (i. e. that lunar time in connection with human must have begun to be reckoned not from the conjunction but from the phasis, and from a phasis as late as the phasis *tertia* too,) appears to be only a necessary inference from the facts which have been brought to light in the preceding parts of our work. For 1st—we have seen[d], that among the Egyptians in particular, for some reason or other, the luna *prima,* in the sense of the first light, or first phasis, the luna *secunda,* in that of the second, and the luna *tertia,* in that of the third,

[d] ii. 522, 523. Diss. xiii. ch. iii. sect. vi.: iv. 371 sqq. Diss. xviii. ch. ii. sect. ii.: iii. 354 note, Diss. xv. ch. v. sect. vii.

were held in peculiar reverence and estimation; the best explanation of which is the fact that tradition had perpetuated among them the existence of an epochal lunar term, the fourth from the conjunction, the third from the phasis; the true date of the entire decursus of lunar time in connection with human existence: and that of two ante-epochal terms, both dated from the phasis, one on the luna *secunda* the other on the luna *tertia*, the next in importance and therefore in sacredness to this. This is no doubt at bottom the true reason of the respect paid to the luna *quarta*, (the *tertia* from the phasis,) the epoch of the historical Apis cycle itself of later date: viz. that it thus appeared to be the proper representative of the epoch of true lunar and human and mundane time from the first.

ii. We have seen[e] that this historical Apis cycle of later date in Egypt was itself directly derived from a Primitive cycle of the same kind coeval with human existence; and in Egypt perpetuated along with the Primitive solar year down to B.C. 973 itself. We have seen too[e] that the solar date of this Primitive lunar cycle from the first down to B. C. 973 must have been the 8th of Thoth. Now the 8th of Thoth, B. C. 4004 Æra Cyclica 1, reckoned according to the primitive rule, coincided with the Julian May 1 at 18 hours. The lunar term then corresponding to this Primitive solar one, Thoth 8th, must have been that which corresponded to the Julian May 1 at 18 hours; i. e. the Luna *tertia* reckoned from the phasis, the luna *quarta* reckoned from the change.

iii. We have seen[f] that Egyptian tradition connected the Γένεσις κόσμου with the 29th luna; Chaldaic, with the 28th; Persian, with the 25th. These traditions appear to have been only accidentally different; and the same explanation is probably to be given of each: viz. the fact that the luna prima of the Hexaëmeron (which was strictly speaking that of the Γένεσις κόσμου) anticipated more or less on the luna prima of civil, i. e. human and mundane, time.

The last lunation in the cycle of 25 years is one of 30 days. But at the end of a period of 600 years[g], it must be assumed as one of 29 days. Now if the first luna *prima* of civil time is supposed to have been the luna *quarta*, $=33^{a}$, the luna of the Γένεσις, as the first luna of a new Period of 600 years, might be assumed as the $33^{a}-4$ or the 29th. And thus we should account for the Egyptian tradition to that effect. The Chaldaic tradition would evidently be only accidentally different from the Egyptian, if the Egyptians reckoned

[e] iv. 368 sqq. Diss. xviii. ch. ii. [f] iv. 370 note. [g] iv. 386. Diss. xviii. ch. ii. sect. iv.

this 29th luna, according to the Phœnix rule, from noon, the Chaldees, according to the primitive rule, from sunset the day before. The Persian tradition recognised an hexaëmeron, or period of six days, supposed to have coincided with the last six days of some lunar month; and the first of these being the Luna 25^a, the fourth (the true date of the new moon of the Hexaëmeron) would be the Luna 28^a: so that the Persian tradition was probably to the same effect as the Chaldaic.

iv. The strongest presumption in favour of the truth of the fact for which we are contending, in our opinion, is the proper sense of the term for the lunar month in the Hebrew; and the peculiar idiom of Scripture in the reckoning of lunar time. We have shewn that this term was iree[h], the proper name of the lunar, in contradistinction to the solar, month from the first; and that the proper sense of iree is that of the lunar month dated from some visible state of the moon itself. Now this is explained, if lunar time in the sense of civil, that is, in conjunction with human existence, from the first, actually bore date from the phasis *tertia*, or the luna *quarta*. The proper sense of the old word for month, in the Greek language, μεὶς, it has also been seen[i] was to the same effect. That too denoted the lunar month reckoned from the luna 3^a or 4^a. Lastly, all this is greatly confirmed by the peculiar idiom of Scripture in the reckoning of time by the lunar month, especially on occasions which required greater exactness than usual in that kind of reckoning itself; for we have seen, from some very critical proofs of the fact[k], that Scripture, in other words inspiration itself, purposely reckons lunar time not from the change but from the phasis: and from a state of the phasis which is determined by the circumstances of the case to be that of the moon three or four days old. The best explanation (in fact the only consistent one) of this mode of reckoning is simply that none else would have been agreeable to the truth; and therefore that none else could be proper for Scripture.

For these reasons then which, to the best of our judgment, appear to be decisive of the truth of the fact, we conclude that, albeit the new moon of the Hexaëmeron must have borne date at or about noon or sunset, for the proper meridian, on the feria *quarta*, and consequently two days before the creation of man; lunar time in the sense of civil, and of the proper civil time, of that denomination, of the present system of things, *de facto* began to be reckoned on May 1 at

h i. 259. Diss. v. ch. ii. sect. ii.: ii. 213. Diss. x. ch. vi. sect. iii.

i i. 60, note, Diss. ii. ch. ii. sect. i.

k ii. 214, 215, note, Diss. x. ch. vi. sect. iii.

18 hours, according to the primitive rule, on May 2 at midnight according to the Julian; the feria *prima* of the first week after the Hexaëmeron in either case: and consequently on the luna *quarta* dated from the change, the luna *tertia* dated from the phasis; and two days later than the creation of man, April 30, the feria *sexta* of the Hexaëmeron.

We have observed, in former parts of our work[l], that the natural measures of time returned in A. M. 4001 B. C. 4, the year of the Nativity, to the same relations one to another, in which and under which they began to proceed together A. M. 1 B. C. 4004, in the year of the Creation. This however is not strictly correct; and therefore those statements of ours must be retracted or modified. The comparison of these two years, A. M. 1 B. C. 4004 and A. M. 4001 B. C. 4, according to our Tables when properly corrected, and of their respective solar and lunar and noctidiurnal or hebdomadal characters, will satisfy any one that the assertion of such a coincidence would not be sustained and confirmed by the matter of fact.

On a former occasion however[m], when we were considering the probable reasons of the change made in the reckoning of calendar time at the Exodus, for the use and observance of the people of Israel in particular, we pointed out certain analogies between the first Nisan of that kind B. C. 1520, and the Nisan of the Nativity B. C. 4, and the Nisan of the year of the Fall B. C. 4001; which appeared to throw much light upon them. We have since calculated the true new moon of March B. C. 4001, and the true new moon of March B. C. 4; and, as those calculations bring a remarkable coincidence to light, we will subjoin them both here.

ii. New moon of March B. C. 4001, for the meridian of Jerusalem. First year of the cycle of leap-year. Epoch, April 29 at 12 h. A.D. 1804. Interval, 5804 mean Julian years. Secular correction, 58·01 centuries. Mean vernal equinox B. C. 4004 to mean vernal equinox B. C. 4001, 3 mean tropical years.

At Greenwich.

		°	′	″		h.	m.	s.	
i. S L		0	0	0·0	April 24	15	5	44·2	B. C. 4001
	−	28	42	39·244	= −29	3	5	44·2	
S L =		331	17	20·756	Mar. 26	12	0	0	
ii. M L Epoch		72	32	51·407	April 29	12	0	0	A. D. 1804
− 5804 years	−	27	38	51·077					−5804
		44	54	0·330					
Corr. 58·01 c.	+	8	58	25·767					
M L =		53	52	26·097	April 29	12	0	0	B. C. 4001

[l] i. 447 : ii. 21, 22 : 371.

[m] ii. 260, Diss. x. ch. ix. sect. iv.

	° ′ ″		h. m. s.	
M L =	53 52 26·097	April 29	12 0 0	B. C. 4001
	− 87 59 50·918	−34		
M L =	325 52 35·179	Mar. 26	12 0 0	

		° ′ ″		h.
iii. SL′ } iv. M L′ }	S L =	331 17 20·756	Mar. 26	12
	−M L =	−325 52 35·179		

	° ′ ″		h. m. s.
D =	5 24 45·577	=T	= 9 51 31·788
D′D″D‴D⁗D′′′′′ = +	0 26 15·446	T′T″T‴T⁗T′′′′′	= + 47 49·579
D′D″D‴D⁗D′′′′′ D =	5 51 1·023	T′T″T‴T⁗T′′′′′ T	= 10 39 21·367

	° ′ ″			h. m. s.
S L =	331 17 20·756	v. M T =	March 26	12 0 0
D′D″D‴D⁗D′′′′′ =	+ 26 15·446	T′T″T‴T⁗T′′′′′	+	10 39 21
S L′ = M L′ =	331 43 36·202	vi. M T′ =	March 26	22 39 21

	° ′ ″		h. m. s.	
vii. A L, =	0 3 5·189	April 24	15 5 44·2	B. C. 4001
A L′ =	0 3 0·341	Mar. 26	22 35 44·2	

	° ′ ″		h. m. s.	
viii. P L, Epoch	42 45 2·028	April 29	12 0 0	A. D. 1804
−5804 years	− 7 26 45·510			−5804
	35 18 16·518			
Corr. 58·01 c.	− 33 13 15·405			
P L =	2 5 1·113	April 29	12 0 0	B. C. 4001
ix. P L′ =	358 20 43·278	Mar. 26	22 39 21	

	° ′ ″		h. m. s.	
x. N L, Epoch	308 57 57·375	April 29	12 0 0	A. D. 1804
−5804 years	+ 298 59 34·895			−5804
	247 57 32·270			
Corr. 58·01 c.	− 5 29 32·945			
N L =	242 27 59·325	April 29	12 0 0	B. C. 4001
xi. NL′ =	244 14 36·324	Mar. 26	22 39 21	

	° ′ ″		s ° ′ ″	
xii. SA = SL′ − AL′ =	331 40 35·861	=	11 1 40·597 7	
xiii. MA = ML′ − PL′ =	333 22 52·924	=	11 3 22 52·924	Per.
		=	5 3 22 52·924	Ap.
xiv. ND = SL′ − NL′ =	87 28 59·878	=	2 27 28·997 9	

					h. m. s.
xv.	E	Argt. SA	=	+	1 56 51·052
	E′	Argt. MA′ = MA + x	=	+	3 59 3·771
	E″	Argt. SA − MA′	=	−	0 12·22
	E‴	Argt. ND	=	+	8·1
	E E′ E″ E‴		=	+	5 55 50·703

			h. m. s.	
xvi.	MT′	= March 26	22 39 21	
	E E′ E″ E‴ =	+	5 55 50·7	
	MT′	= March 27	4 35 11·7	Mean time at Greenwich.
	MT‴	= March 27	6 55 58·7	Mean time at Jerusalem.

The result of this calculation is consequently:

		h. m. s.	
Mean new moon,	March 26	22 39 21	Mean time at Greenwich.
	March 27	1 0 8	Mean time at Jerusalem.
True new moon,	March 27	4 35 11·7	Mean time at Greenwich.
	March 27	6 55 58·7	Mean time at Jerusalem.

iii. New moon of March B. C. 4, for the meridian of Jerusalem. Second year of the cycle of leap-year. Epoch, April 29 at 12 h. A. D. 1801. Interval, 1804 mean Julian years. Secular correction, 18.04 centuries. Mean V. E. B. C. 4004 to mean V. E. B. C. 4, 4000 mean tropical years. Cf. ii. 206. Diss. x. ch. v. sect. viii.

			° ′ ″	*At Greenwich.* h. m. s.	
i.	SL	=	0 0 0·0	March 24 21 39 13·0	B. C. 4
		+	2 33 37·732	+ 2 14 20 47	
	SL	=	2 33 37·732	March 27 12 0 0	
			° ′ ″	h. m. s.	
ii.	M L. Epoch		31 13 1·811	April 29 12 0 0	A. D. 1801
	— 1804 y	=	−312 31 18·232		— 1804
			78 41 43·579		
	Corr. 18·04, C.	=	+ 56 16·108		
	M L	=	79 37 59·687	April 29 12 0 0	B. C. 4
			− 74 49 15·891	— 33	
iii.	S L′ } M L	=	4 48 43·796	March 27 12 0 0	
iv.	ML′ } − SL	= −	2 33 37·732		

				h. m. s.
D =	2 15 6·064 =	T =		4 6 4·700
D′ D″ D‴ D⁗ =	+ 10 55·370 =	T′ T″ T‴ T⁗ =		19 53·714
D′ D″ D‴ D⁗ D =	2 26 1·434 =	T′ T″ T‴ T⁗ T =	−	4 25 58·414

		°	′	″			h.	m.	s.
SL	=	2	33	37·732	v.	MT = Mar. 27	12	0	0
D′D″D‴D⁗	=	—	10	55·370		TT′T″T‴T⁗ =	— 4	25	58
SL′ = ML	=	2	22	42·362	vi.	MTᵛ = Mar. 27	7	34	2

		°	′	″		m.	h.	s.
vii. AL, 4000 y.	=	68	35	18·164	March 24	21	39	13·0
AL′	=	68	35	18·572	= March 27	7	39	13

		°	′	″		h.	m.	s.	
viii. PL. Epoch		280	39	4·766	April 29	12	0	0	A.D. 1801
− 1804 years		−325	35	41·478					— 1804
		315	3	23·288					
Corr. 18·04, C.	=	−3	28	18·292					
ix. PL	=	311	35	4·996	April 29	12	0	0	B.C. 4
PL′	=	307	53	16·076	March 27	7	34	2	

		°	′	″		h.	m.	s.	
x. NL. Epoch		7	0	14·957	April 29	12	0	0	A.D. 1801
− 1804 y.	+	332	21	14·898					— 1804
		339	21	29·855					
Corr. 18·04 C.	=	−	34	26·367					
xi. NL	=	338	47	3·488	April 29	12	0	0	B.C. 4
NL′	=	340	32	29·702	March 27	7	34	21	

		°	′	″		s.	°	′	″	
xii. SA	=	293	47	23·79	=	9	23	47·3965		
xiii. MA	=	54	29	26·286	=	1	24	29	26·286	Per.
					=	7	24	29	26·286	Ap.
xiv. ND	=	21	50	12·66	=	0	21	50·211		

				h.	m.	s.
xv.	E	Argt. SA	= +	3	47	41·7
	E′	Argt. M′A′ = MA + x	= −	7	45	20·1
	E″	Argt. SA − MA′	= −		4	5·6
	E‴	Argt. ND	= +		1	4·5
	EE′E″E‴		= −	4	0	39·5

			h.	m.	s.	
xvi. MTᵛ	=	March 27	7	34	2	
EE′E″E‴	=		− 4	0	39·5	
MT′	=	March 27	3	33	22·5	Mean time at Greenwich.
MT″	=	March 27	5	54	9·5	Mean time at Jerusalem.

The result of this calculation too is,

		h.	m.	s.	
Mean new moon	March 27	7	34	2	Mean time at Greenwich.
	March 27	9	54	49	Mean time at Jerusalem.

		h. m. s.	
True new moon	March 27	3 33 22·5	Mean time at Greenwich.
	March 27	5 54 9·5	Mean time at Jerusalem.

It appears therefore that the new moon of March B. C. 4001 fell on March 27, and the new moon of March B. C. 4 fell on March 27 also; the former according to our calculation,

		h. m. s.	
	March 27	6 55 58·7	Mean time at Jerusalem.
the latter,	March 27	5 54 9·5	— —
		1 1 49·2	

Now of these two calculations the latter is much more to be depended on; and probably it is not more than fifteen or sixteen minutes in defect of the truth. The former, for that distance of time, must be more or less in error: and if in error at all, for the same reason in this instance as in that of the new moon of April B. C. 4004, it may be in excess not in defect; i. e. it may shew the true new moon too late not too early. It may be as much as an hour of mean time in excess in this respect: so that it is a possible, and even probable, contingency that the true date of this new moon of March, B. C. 4001, and that of the same month B. C. 4 might be almost the same. On this principle, the solar character of this month, B.C. 4001, supposed to be called Nisan, must have been the same as that of the Nisan of the Exodus, B.C. 1520. Both bore date March 26 at 18 h. or March 27 at midnight. Its lunar character too must have been the same as that of the Nisan of B. C. 4. Both might be reckoned to bear date on March 27 at midnight alike, or on March 27 at 18 hours. On the tenth day of the Nisan of B. C. 4001, April 5, we have seen reason to date the Fall: on the tenth day of the Nisan of B. C. 1520, April 5 also, the lambs were set apart for the first Passover: on the tenth day of the Nisan of B. C. 4, April 5 also, according to the Julian rule, we must date the Nativity.

We have also seen reason to conclude that this year, B. C. 4001, dated from the day of the Fall, April 5 the feria *sexta*, was the close of the Æra of Immortality, and the beginning of the Æra of Mortality; the former as proper even to the present system of things before the event of the Fall, as the latter after it[n]. We have thought it worth while to calculate the new moon of April, for this year; as well as that of March.

[n] ii. 243–267.

iv. New moon of April, B.C. 4001, for the meridian of Jerusalem.

		° ′ ″		At Greenwich. h. m. s.	
i.	SL	0 0 0·0	April 24	15 5 44·2	B. C. 4001
		+ 51 30·653		+ 20 54 15·8	
	SL =	0 51 30·653	April 25	12 0 0·0	

		° ′ ″		h. m. s.	
ii.	ML (cal. ii.)	53 52 26·097	April 29	12 0 0	B. C. 4001
	ML .. =	1 10 5·989	April 25	12 0 0	

		° ′ ″	
iii.	SL′ ML =	1 10 5·989	April 25 12 0 0
iv.	ML′ −SL = −	51 30·653	

	′ ″		m. s.
D =	18 35·336	= T =	33 51·516
D′ D″ D‴ D⁗ =	1 30·171	T′ T″ T‴ T⁗ =	2 44·242
D′ D″ D‴ D⁗ D =	20 5·507	T′ T″ T‴ T⁗ T =	36 35·758

	° ′ ″		h. m. s.
SL =	0 51 30·653	v. MT = Apr. 25	12 0 0
D′ D″ D‴ D⁗ =	− 1 30·171	T′T″T‴T⁗T′⁗ =	− 36 36
SL′ = ML′ =	0 50 0·482	vi. MT′ = Apr. 25	11 23 24

		° ′ ″		h. m. s.
vii.	AL (3 y.) =	0 3 5·189	April 24	15 5 44·2
	AL′ =	0 3 5·331	April 25	11 23 44·2

		° ′ ″		h. m. s.	
viii.	PL (calc. ii.) =	2 5 1·113	April 29	12 0 0	B. C. 4001
ix.	PL′ =	1 38 6·696	April 25	11 23 24	

		° ′ ″		h. m. s.	
x.	NL (calc. ii.) =	242 27 59·325	April 29	12 0 0	B. C. 4001
xi.	NL′ =	242 40 46·716	April 25	11 23 24	

		° ′ ″		s. ° ′
xii.	SA =	0 46 55·151	=	0 0 46·919
xiii.	MA =	359 11 53·786	=	11 29 11 53·786 Per.
			=	5 29 11 53·786 Ap.
xiv.	ND =	118 9 13·776	=	3 28 9·2296

				h. m. s.
xv.	E	Argt. SA	=	− 0 3 21·751
	E′	Argt. MA′ = MA − x	=	+ 0 7 52·819
	E″	Argt. SA − MA′	=	+ 0 0 8·024
	E‴	Argt. ND	=	− 0 1 20·154
	E E′ E″ E‴		=	+ 3 18·938

				h.	m.	s.	
xvi.	MT′	=	April 25	11	23	24	
	E E′ E″ E‴	=		+	3	19	
	MT″	=	April 25	11	26	43	Mean time at Greenwich.
	MT‴	=	April 25	13	47	30	Mean time at Jerusalem.

The result of this calculation is consequently,

		h.	m.	s.	
Mean new moon	April 25	11	23	24	Mean time at Greenwich.
	April 25	13	44	11	Mean time at Jerusalem.
		h.	m.	s.	
True new moon	April 25	11	26	43	Mean time at Greenwich.
	April 25	13	47	30	Mean time at Jerusalem.

And this too brings a remarkable coincidence to light; viz. that the date of the new moon of April B. C. 4001 for the meridian of Jerusalem bore the same relation to the point of mean noon as that of April B. C. 4004. We had the latter

		h.	m.	s.	
	April 28	13	46	25.555	Mean time at Jerusalem.
We have this	April 25	13	47	30	Mean time at Jerusalem.
Difference		0	1	4·445	

It follows that true lunar time, reckoned from the first conjunction in the first year of the Æra of Mortality, the first after the Fall, April 5 B. C. 4001, viz. April 25, must have proceeded exactly in the same way as true lunar time reckoned from the conjunction of the Hexaëmeron itself, April 28 B. C. 4004, the first year of the Æra of Immortality, proper to the present system of things also. It happened also B. C. 4001 that mean lunar time dated from the same epoch must have been scarcely distinguishable from true (which was not the case B. C. 4004); for the mean conjunction, as the above calculation shews, April 25 B. C. 4001, anticipated only 3 m. 19 sec. on the true.

v. Full moon of April, B. C. 4005, for the meridian of Jerusalem. First year of the cycle of leap-year. Epoch, April 29 at 12 h. A. D. 1804. Interval, 5808 mean Julian years. Secular correction, 58·05 centuries. Mean V. E. B. C. 4004 to mean V. E. B. C. 4005 = − 1 mean tropical year. Vol. ii. 56.

			°	′	″	*At Greenwich.*	h.	m.	s.	
i.	S L		0	0	0·0	April 24	15	50	22·6	B.C. 4005.
				−9	27·675		−3	50	22·6	
	S L	=	359	50	32·325	April 24	12	0	0	

			°	′	″		h.	m.	s.	
ii.	M L. Epoch		72	32	51·407	April 29	12	0	0	A.D. 1804.
	−5808 years.		−198	21	45·530					— 5808.
			234	11	5·877					
	Corr. 58·05 C	=	+8	59	7·725					
	M L	=	243	10	13·602	April 29	12	0	0	B. C. 4005.
	M L′	=	177	17	18·467	April 24	12	0	0	
iii. S L′ } iv. S L′ }	S L + 180°	=	179	50	32·325	April 24	12			
	−M L		−177	17	18·467					
	D	=	2	33	13·858		=4	39	6·051	
	$D'D''D'''D''''D'''''$	=	+	12	23·338	$=T'T''T'''T''''T''''' =$	+	22	33·946	
	$D'D''D'''D''''D'''''D$	=	2	45	37·196	$=T'T''T'''T''''T'''''T=$	5	1	39·997	
	S L	=	359	50	32·325	v. M T = April 24	12	0	0	
	$D'D''D'''D''''D'''''$	=	+	12	23·338	$=T'T''T'''T''''T'''''T=$ +		5	1	40
	S L′	=	0	2	55·663	vi. M T′ = April 24	17	1	40	
	S L′ + 180 = M L′	=	180	2	55·663					
vii.	A L (−1 y.)	=	359	58	58·270	April 24	15	50	22·6	B.C 4005.
	A L′	=	359	58	58·277	April 24	16	50	22·6	
viii.	P L. Epoch		42	45	2·028	April 29	12	0	0	A.D. 1804.
	− 5808 years		−170	12	28·174					— 5808.
			232	32	33·854					
	Corr. 58·05 C	=	−33	15	50·731					
	P L	=	199	16	43·123	April 29	12	0	0	B. C. 4005.
ix.	P L′	=	198	44	41·862	April 24	17	1	40	
x.	N L. Epoch		308	57	57·375	April 29	12	0	0	A.D. 1804.
	−5808 y.	=	+16	21	34·795					— 5808.
			325	19	32·170					
	Corr. 58·05 C	=	−5	29	58·606					
	N L	=	319	49	33·564	April 29	12	0	0	B. C. 4005.
xi.	N L′	=	320	4	46·810	April 24	17	1	40	

			°	′	″		s.	°	′	″	
xii.	S A	=	0	3	57·386	=	0	0	3·9564		
xiii.	M A	=	341	18	13·801	=	11	11	18	13·801	Per.
						=	5	11	18	13·801	Ap.
xiv.	N D	=	39	58	8·853	=	1	9	58·1475		

				h. m. s.
xv.	E Argt. S A	=	−	0 0 17·013
	E′ Argt. M A′ = M A − x	=	+	2 54 58·681
	E″ Argt. S A = M A′	=	+	1 33·819
	E‴ Argt. N D	=	+	1 31·969
	E E′ E″ E‴	=	+	2 57 47·456

			h. m. s.	
xvi.	M T	=	April 24 17 1 40	
	E E′ E″ E‴	=	+ 2 57 47·456	
	M T′	=	April 24 19 59 27·456	Mean time at Greenwich.
	M T″	=	April 24 22 20 14·456	Mean time at Jerusalem.

The result of this calculation is

	h. m. s.	
Mean full moon,	April 24 17 1 40	Mean time at Greenwich.
	April 24 19 22 27	Mean time at Jerusalem.
True full moon,	April 24 19 59 27·456	Mean time at Greenwich.
	April 24 22 20 14·456	Mean time at Jerusalem.

vi. Full moon of May B.C. 2348, for the meridian of Jerusalem. Second year of the cycle of Leap-year. Epoch, April 29 at 12 h. A.D. 1801. Interval, 4148 mean Julian years. Secular correction, 41·48 centuries. Mean V. E. B.C. 4004 to mean V. E. B.C. 2348, 1656 mean tropical years. Vol. ii. 178.

At Greenwich.

		° ′ ″		h. m. s.	
i. SL	=	0 0 0·0	April	12 1 38 15·4	B.C. 2348
		+ 23 5 43·637	+	23 10 21 44·6	
SL	=	23 5 43·637	May	5 12 0 0·0	
ii. ML. Epoch		31 13 1·811	April	29 12 0 0	A.D. 1801
− 4148 years		− 271 35 7·599			− 4148
		119 37 54·212			
Corr. 41·48 C	= +	4 44 28·439			
ML	=	124 22 22·651	April	29 12 0 0	B.C. 2348
ML	=	203 25 52·813	May	5 12	
iii. SL′ } iv. ML′ } ML	=	203 25 52·813 }	May	5 12 h	
− SL + 180°	= −	203 5 43·637 }			
D	=	0 20 9·176	=	0 20 9·2	

		° ′ ″			m. s.
D	=	0 20 9·2	=	T	= 36 42·484
D′ D″ D‴	=	+1 37·725		T′ T″ T‴	= + 2 58·000
D′ D″ D‴ D	=	0 21 46·925	=	T′ T″ T‴ T	= 39 40·484

		° ′ ″			h. m. s.
SL	=	23 5 43·637	v.	MT = May 5	12 0 0
D′ D″ D‴	=	− 1 37·725		T′ T″ T‴ T⁗ =	− 39 40
SL′	=	23 4 5·912	vi.	MT′ = May 5	11 20 20
SL′ + 180 = ML′	=	203 4 5·912			

		° ′ ″			h. m. s.	
vii. AL 1656 y.	=	28 23 44·120	April	12	1 38 15·4	B. C. 2348
AL′	=	28 23 48·077	May	5	11 38 15·4	

		° ′ ″			h. m. s.	
viii. PL. Epoch		280 39 4·766	April	29	12 0 0	A. D. 1801
−4148 years		− 304 2 22·601				−4148
		336 36 42·165				
Corr. 41·48 C		−17 33 7·068				
PL	=	319 3 35·097	April	29	12 0 0	B. C. 2348
ix. PL′	=	319 43 30·384	May	5	11 20 20	

		° ′ ″			h. m. s.	
x. NL. Epoch		7 0 14·957	April	29	12 0 0	A. D. 1801
−4148 years		+309 12 16·297				−4148
		316 12 31·254				
Corr. 41·48 C		−2 54 6·843				
NL	=	313 18 24·411	April	29	12 0 0	B. C. 2348
xi. NL′	=	312 59 25·843	May	5	11 20 20	

			° ′ ″		s. ° ′ ″	
ii.	SA	=	354 40 17·8	=	11 24 40·296	
xiii.	MA	=	243 20 35·5	=	8 3 20 355	Per.
				=	2 3 20 35·5	Apog.
xiv.	ND	=	70 4 40·1	=	2 10 4·668	

				h. m. s.
xv.	E Argt. SA	=	+	0 22 47·7
	E′ Argt. MA′ = MA + x	=	+	9 2 24·8
	E″ Argt. SA − MA′	=	+	4 35·6
	E‴ Argt. ND	=	+	1 2·8
	E E′ E″ E‴	=	+	9 30 50·9

			h. m. s.	
xvi. MT′	=	May 5	11 20 20	
E E′ E″ E‴	=		+ 9 30 50·9	
MT″	=	May 5	20 51 10·9	Mean time at Greenwich.
MT‴	=	May 5	23 11 57·9	Mean time at Jerusalem.

The result of this calculation is consequently

		h. m. s.	
Mean full moon,	May 5	11 20 20	Mean time at Greenwich.
	May 5	13 41 7	Mean time at Jerusalem.
		h. m. s.	
True full moon,	May 5	20 51 10·9	Mean time at Greenwich.
	May 5	23 11 57·9	Mean time at Jerusalem.

vii. New moon of March, B.C. 1966, for the meridian of Jerusalem. Fourth year of the cycle of Leap-year. Epoch April 29 at 12 h. A.D. 1803. Interval, 3768 mean Julian years. Secular correction, 37·66 centuries. Mean V. E. B.C. 4004 to mean V. E. B.C. 1966, 2038 mean tropical years. Vol. ii. 206. cf. Introduction to the Tables, 288. Part iii. ch. ii. sect. iii.

		° ′ ″		*At Greenwich.* h. m s.	
i. SL	=	0 0 0·0	April 9	14 35 8·2	B. C. 1966
	−	10 56 53·904	—	11 2 35 8·2	
SL	=	349 3 6·096	Mar. 29	12 0 0	

		° ′ ″		h. m. s.	
ii. ML. Epoch		289 59 11·523	April 29	12 0 0	A. D. 1803
− 3768 years	−	253 38 54·580			— 3768
		36 20 16·943			
Corr. 37·66 C.	=	+ 3 56 14·338			
ML	=	40 16 31·281	April 29	12 0 0	B. C. 1966
ML	=	351 48 25·444	Mar. 29	12 0 0	

			° ′ ″			h. m. s.
iii. SL′ } iv. ML′ }	ML	=	351 48 25·444 }	Mar. 29 12 h.		
	−SL	=	−349 3 6·096 }			
	D	=	2 45 19·348			
		=	2 45 19·3	=	T =	5 1 7·398
D′ D″ D‴ D⁗		=	+ 13 21·969	= T′ T″ T‴ T⁗	= +	24 20·737
D′ D″ D‴ D⁗ D		=	2 58 41·269	= T′ T″ T‴ T⁗ T	=	5 25 28·135

		° ′ ″			h. m s.
SL	=	349 3 6·1	v. MT′	= Mar. 29	12 0 0
D′ D″ D‴ D⁗	=	− 13 22·0	T′ T″ T‴ T⁗ T =	−	5 25 28
SL′ = ML′	=	348 49 44·1	vi. MT′	= Mar. 29	6 34 32

		° ′ ″		h. m. s.	
vii. AL, 2038 y.	=	34 56 44·804	April 9	14 35 8·2	B. C. 1966
AL′	=	34 56 42·889	Mar. 29	6 35 8·2	

		° ′ ″		h. m. s.	
viii. PL. Epoch		1 58 35·570	April 29	22 0 0	A. D. 1803
−3768 years	−	321 39 49·518			− 3768
		40 18 46·052			
Corr. 37·66 C.	= −	14 34 33·158			
PL	=	25 44 12·894	April 29	12 0 0	B. C. 1966
ix. PL′	=	22 15 29·515	Mar. 29	6 34 32	

		° ′ ″		h. m. s.	
x. NL. Epoch		328 20 50·327	April 29	12 0 0	A. D. 1803
−3768 years	+	159 22 25·797			− 3768
		127 43 16·124			
Corr. 37·66 C.	=	−2 24 35·491			
NL	=	125 18 40·633	April 29	12 0 0	B. C. 1966
xi. NL′	=	126 57 53·452	Mar. 29	6 34 32	

xii.	SA	=	313° 53′ 1″·2	=	10s 13° 53′·02
xiii.	MA	=	326° 34′ 14″·6	=	10s 26° 34′ 14″·6 Per.
				=	4 26 34 14·6 Apog.
xiv.	ND	=	221° 51′ 50″·6	=	7s 11° 51′·843

				h. m. s.
xv.	E	Argt. SA	=	+ 2 58 14
	E′	Argt. MA′ = MA + x	=	+ 4 53 48·6
	E″	Argt. SA − MA′	=	− 1 9·1
	E‴	Argt. ND	=	+ 1 33
E E′ E″ E‴			=	+ 7 52 26·5

			h. m. s.	
xvi. MT′	=	March 29	6 34 32	
E E′ E″ E‴	=	+	7 52 26·5	
MT″	=	March 29	14 26 58·5	Mean time at Greenwich.
MT‴	=	March 29	16 47 45·5	Mean time at Jerusalem.

The result of this calculation is

		h. m. s.	
Mean new moon,	March 29	6 34 32	Mean time at Greenwich.
	March 29	8 55 19	Mean time at Jerusalem.
True new moon,	March 29	14 26 58·5	Mean time at Greenwich.
	March 29	16 47 45·5	Mean time at Jerusalem.

viii. New moon of March B. C. 1933, for the meridian of Jerusalem. First year of the cycle of Leap-year. Epoch, April 29 at 12h. A.D. 1804. Interval, 3736 mean Julian years. Secular correction, 37·33 centuries. Mean V. E. B.C. 4004 to mean V. E. B.C. 1933, 2071 mean tropical years. Vol. ii. 206. Cf. Introduction to the Tables, 288. Part. iii. ch. ii. sect. iii.

At Greenwich.

		° ′ ″	h. m. s.	
i.	SL	= 0 0 0·0	April 8 14 26 51·4	B. C. 1933
		− 15 52 15·151	− 16 2 26 51·4	
	SL	=344 7 44·849	Mar. 23 12 0 0	

	° ′ ″	h. m. s.	
ii. ML. Epoch	= 72 32 51·407	April 29 12 0 0	A. D. 1804
−3736 years	−327 55 38·956		— 3736
	104 37 12·451		
Corr. 37·33 C.	+3 52 15·921		
ML	=108 29 28·372	April 29 12 0 0	B. C. 1933
ML	=340 57 52·373	Mar. 23 12 0 0	

		° ′ ″			h. m. s.
iii. SL, iv. ML′	SL =	344 7 44·849	Mar. 29 12 h.		
	−ML =	−340 57 52·373			
	D =	3 9 52·476			
	=	3 9 52·5 =		T =	5 45 50·742
	$D'D''D'''D''''D'''''$ =	+15 21·104 =	$T'T''T'''T''''T'''''$	=	+27 57·799
	$D'D''D'''D''''D'''''D$ =	3 25 13·604	$T'T''T'''T''''T'''''T$	=	6 13 48·541

	° ′ ″		h. m. s.
SL	=344 7 44·8	v. MT	=Mar. 23 12 0 0
$D'D''D'''D''''D'''''$ =	+ 15 21·1	$T'T''T'''T''''T'''''T$ =	+ 6 13 48
SL′=ML′	=344 23 5·9	vi. MT′	=Mar. 23 18 13 48

	° ′ ″	h. m. s.	
vii. AL, 2071 y.	= 35 30 41·880	April 8 14 26 51·4	B. C. 1933
AL′	= 35 30 39·204	Mar. 23 18 26 51·4	

	° ′ ″	h. m. s.	
viii. PL. Epoch	= 42 45 2·028	April 29 12 0 0	A. D. 1804
−3736 years	− 99 34 8·206		− 3736
	303 10 53·822		
Corr. 37·33 C.	− 14 19 50·544		
PL	= 288 51 3·278	April 29 12 0 0	B. C. 1933
ix. PL′	= 284 45 28·318	Mar. 23 18 13 48	

		°	′	″			h.	m.	s.	
x.	NL. Epoch	308	57	57·375	April	29	12	0	0	A.D. 1804
	−3736 years	+260	26	26·597						− 3736
		209	24	23·972						
	Corr. 37·33 C.	−2	22	9·566						
	NL =	207	2	14·406	April	29	12	0	0	B.C. 1933
xi.	NL′ =	208	58	58·469	Mar.	23	18	13	48	

		°	′	″		s.	°	′	″	
xii.	SA =	308	52	26·7	=	10	8	52.445		
xiii.	MA =	59	37	37·6	=	1	29	37	37·6	Per.
					=	7	29	37	37·6	Apog.
xiv.	ND =	135	24	7·4	=	4	15	24·12		

				h.	m.	s.
xv	E	Argt. SA	=	+3	12	44·8
	E′	Argt. MA′ = MA + x	=	−8	13	41·3
	E″	Argt. SA − MA′	=	−	4	34·06
	E‴	Argt. ND	=	−	1	34
	E E′ E″ E‴		=	−5	7	4·56

				h.	m.	s.	
xvi.	MT′ =	March	23	18	13	48	
	E E′ E″ E‴ =		−	5	7	4·56	
	MT″ =	March	23	13	6	43·44	Mean time at Greenwich.
	MT‴ =	March	23	15	27	30·44	Mean time at Jerusalem.

The result of this calculation consequently is,

Mean new moon,	March	23	18	13	48	Mean time at Greenwich.
	March	23	20	34	35	Mean time at Jerusalem.
True new moon,	March	23	13	6	43·44	Mean time at Greenwich.
	March	23	15	27	30·44	Mean time at Jerusalem.

ix. Full moon of April B. C. 1933, for the meridian of Jerusalem. Vol. ii. 206: Introduction to the Tables, 290, Part iii. ch. ii. sect. iii.

			°	′	″			h.			
i.	SL (Cal. viii.)	=	344	7	44·849	March	23	12	0	0	B.C. 1933
		=	358	54	49·798	April	7	12			
	SL + 180	=	178	54	49·798	April	7	12			
ii.	ML (Cal. viii.)	=	340	57	52·373	March	23	12			
	ML		178	36	37·778	April	7	12			

		° ′ ″		h.
iii. SL′ } SL	=	178 54 49·798 }	April 7	12
iv. ML′ } −ML	=	−178 36 37·778 }		

						h. m. s.
D	=	0 18 12·020				
	=	0 18 12	=	T	=	0 33 9·011
D′ D″ D‴	=	1 28·252		T′ T″ T‴	=	2 40·746
D′ D″ D‴ D	=	19 40·252		T′ T″ T‴ T	=	35 49·757

		° ′ ″			h. m. s.
SL	=	358 54 49·798	v. MT	= April 7	12 0 0
D′ D″ D‴	=	+ 1 28·252	T T′ T″ T‴ =		+ 35 50
SL′	=	358 56 18·050	vi. MT′	= April 7	12 35 50
SL′ + 180 = ML′	=	178 56 18·050			

			° ′ ″		h.
vii.	AL (Cal. viii.)	=	35 30 39·162	March 23	12
	AL′	=	35 30 41·704	April 7	13

			° ′ ″		h. m. s.
viii.	PL (Cal. viii.)	=	284 43 44·210	March 23	12 0 0
ix.	PL′	=	286 24 10·028	April 7	12 35 50

			° ′ ″		h. m. s.
x.	NL (Cal. viii.)	=	208 59 47·955	March 23	12 0 0
xi.	NL′	=	208 12 3·664	April 7	12 35 50

			° ′ ″		s. ° ′ ″	
xii.	SA	=	323 25 36·4	=	10 23 25·606	
xiii.	MA	=	252 32 8·1	=	8 12 32 8·1	Per.
				=	2 12 32 8·1	Ap.
xiv.	ND	=	150 44 14·4	=	5 0 44·24	

				h. m. s.
xv.	E Argt. SA	=	+	2 27 3·7
	E′ Argt. MA′ = MA + x	=	+	9 34 0·3
	E″ Argt. SA − MA′	=	+	4 37·9
	E‴ Argt. ND	=	−	1 20·5
	E E′ E″ E‴	=	+	12 4 21·4

			h. m. s.	
xvi.	MT	=	April 7 12 35 50	
	E E′ E″ E‴	=	+ 12 4 21·4	
	MT″	=	April 8 0 40 11·4	Mean time at Greenwich.
	MT‴	=	April 8 3 0 58·4	Mean time at Jerusalem.

The result of this calculation consequently is,

		h. m. s.	
Mean full moon,	April 7	12 35 50	Mean time at Greenwich.
	April 7	14 56 37	Mean time at Jerusalem.
		h. m. s.	
True full moon,	April 8	0 40 11·4	Mean time at Greenwich.
	April 8	3 0 58·4	Mean time at Jerusalem.

x. Full moon of March, B.C. 1640, for the meridian of Heliopolis in Egypt. Second year of the cycle of Leap-year. Epoch, April 29 at 12 h. A.D. 1801. Interval, 3440 mean Julian years. Secular correction, 34·4 centuries. Mean V. E. B.C. 4004 to mean V. E. B.C. 1640, 2364 mean tropical years. Vol. ii. 216.

At Greenwich.

			° ′ ″		h. m. s.	
i.	SL	=	0 0 0·0	April 6	13 56 58·6	B.C. 1640
		–	27 40 41·482	— 28	1 56 58·6	
	SL	=	332 19 18·518	March 9	12 0 0	
			° ′ ″		h. m. s.	
ii.	ML. Epoch		31 13 1·811	April 29	12 0 0	A.D. 1801
	–3440 y.		–295 0 29·445			–3440
			96 12 32·366			
	Corr. 34·4 C.	= +	3 18 21·266			
			99 30 53·632	April 29	12 0 0	B.C. 1640
	ML	=	147 31 7·255	March 9	12	
iii. SL′ iv. ML′	SL + 180°	=	° ′ ″ 152 19 18·5	March 9	12	
	–ML	= –	147 31 7·3			

				h. m. s.
D	=	4 48 11·2	= T =	8 44 54·863
D′ D″ D‴ D⁗	=	+23 17·984	T′ T″ T‴ T⁗ =	+42 26·343
D′ D″ D‴ D⁗ D	=	5 11 29·184	= T′ T″ T‴ T⁗ T =	9 27 21·206

					h. m. s.
SL	=	332 19 18·5	v. MT =	March 9	12 0 0
D′ D″ D‴ D⁗	=	+ 23 18·0	T′ T″ T‴ T⁗ T	+	9 27 21
SL′	=	332 42 36·5	vi. MT′ =	March 9	21 27 21
SL′ + 180° = ML′	=	152 42 36·5			

			° ′ ″		h. m. s.
vii.	AL 2364 y.	=	40 32 8·634	April 6	13 56 58·6
	AL′	=	40 32 3·951	March 9	20 56 58·6

		° ′ ″		h. m. s.	
viii. PL. Epoch		280 39 4·766	April 29	12 0 0	A.D. 1801
− 3440 y.		−295 11 31·067			− 3440
		345 27 33·699			
Corr. 34·4 C.	=−	12 14 18·285			
PL	=	333 13 15·414	April 29	12 0 0	B. C. 1640
ix. PL′	=	327 34 59·576	March 9	21 27 21	

		° ′ ″		h. m. s.	
x. NL. Epoch		7 0 14·957	April 29	12 0 0	A.D. 1801
− 3440 y.		+295 18 33·998			− 3440
		302 18 48·955			
Corr. 34·4 C.	=−	2 1 24·243			
NL	=	300 17 24·712	April 19	12 0 0	B.C. 1640
xi. NL′	=	302 58 12·063	March 9	21 27 21	

		° ′ ″		s ° ′	
xii. SA	=	292 10 32·5	=	9 22 10·54	
		° ′ ″		s ° ′ ″	
xiii. MA	=	185 7 36·9	=	6 5 7 36·9	Per.
			=	0 5 7 36·9	Ap.
		° ′ ″		s ° ′	
xiv. ND		29 44 24·4	=	0 29 44·406	

					h. m. s.
xv.	E	Argt. SA	=	+	3 50 31·9
	E′	Argt. MA′ = MA + x	=	+	1 12 11·2
	E″	Argt. SA − MA′	=	+	4 46·82
	E‴	Argt. ND	=	+	1 21·48
	E E′ E″ E‴		=	+	5 8 51·4

			h. m. s.	
xvi. MT′	=	March 9	21 27 21	
E E′ E″ E‴	=		+ 5 8 51·4	
MT″	=	March 10	2 36 12·4	Mean time at Greenwich.
			+ 2 5 3	
MT‴	=	March 10	4 41 15·4	Mean time at Heliopolis.

The result of this calculation is,

		h. m. s.	
Mean full moon,	March 9	21 27 11	Mean time at Greenwich.
	March 9	23 32 24	Mean time at Heliopolis.
		h. m. s.	
True full moon,	March 10	2 36 12·4	Mean time at Greenwich.
	March 10	4 41 15·4	Mean time at Heliopolis.

xi. Full moon of June, B.C. 1640, for the meridian of Heliopolis in Egypt. Vol. ii. 217.

At Greenwich.

			°	′	″		h.	m.	s.		
i.	S L (Cal. x.)	=	332	19	18·518	March 9	12	0	0	B.C. 1640.
	S L	=	60	2	39·880	June 6	12			

			°	′	″		h.	m.	s.	
ii.	M L (Cal. x.)	=	147	31	7·255	March 9	12	0	0	B.C. 1640.
	M L	=	240	13	4·658	June 6	12			

			°	′	″	
iii. iv.	M L′ } S L′ } M L	=	240	13	4·658	} June 6 12
	− S L + 180°	=	−240	2	39·880	}

D	=	10 24·778			
	=	10 24·8	=	T =	18 m. 58·035 s.
D′ D″ D‴	=	0 50·494	=	T′ T″ T‴ =	+ 1 31·972
D′ D″ D‴ D	=	11 15·294		T′ T″ T‴ T =	20 30·007

		°	′	″			h.	m.	s.
S L	=	60	2	39·9	v.	M T = June 6	12	0	0
D′ D″ D‴	=		−	50·5		T′ T″ T‴ T =		− 20	30
S L′	=	60	1	49·4	vi.	M T′ = June 6	11	39	30
S L′ + 180° = M L′	=	240	1	49·4					

			°	′	″					
vii.	A L (Cal. x.)	=	40	32	3·888	March 9	11	56	58·6	B.C. 1640.
	A L′	=	40	32	18·930	June 6	11	56	58·6	

			°	′	″		h.	m.	s.	
viii.	P L (Cal. x.)	=	327	32	21·563	March 9	12	0	0	B.C. 1640.
ix.	P L′	=	337	27	9·829	June 6	11	39	30	

			°	′	″		h.	m.	s.	
x.	N L (Cal. x.)	=	302	59	27·172	March 9	12	0	0	B.C. 1640.
xi.	N L′	=	298	16	43·239	June 6	11	39	30	

			°	′	″		s.	°	′	″	
xii.	S A	=	19	29	30·5	=	0	19	29·508		
xiii.	M A	=	262	34	39·6	=	8	22	34	39·6	Per.
						=	2	22	34	39·6	Ap.
xiv.	N D	=	121	45	6·2		4	1	45·1		

				h.	m.	s.
xv.	E	Argt. S A	=	−1	22	6
	E′	Argt. M A′ = M A − x	=	+9	46	40
	E″	Argt. S A − M A′	=	+	4	19·7
	E‴	Argt. N D	=	−	1	24·75
	E E′ E″ E‴		=	+8	27	28·95

				h.	m.	s.	
xvi.	M T′	=	June 6	11	39	30	
	E E′ E″ E‴	=	+	8	27	28·95	
	M T″	=	June 6	20	6	58·95	Mean time at Greenwich.
	M T‴	=	June 6	22	12	1·95	Mean time at Heliopolis.

The result of this calculation is,

		h.	m.	s.	
Mean full moon,	June 6	11	39	30	Mean time at Greenwich.
	June 6	13	44	33	Mean time at Heliopolis.
		h.	m.	s.	
True full moon,	June 6	20	6	58·95	Mean time at Greenwich.
	June 6	22	12	1·95	Mean time at Heliopolis.

xii. New moon of April, B.C. 973, for the meridian of Heliopolis in Egypt. First year of the cycle of Leap-year. Epoch, April 29 at 12 h. A. D. 1804. Interval, 2776 mean Julian years. Secular correction, 27·73 centuries. Mean V. E. B. C. 4004 to mean V. E. B. C. 973, 3031 mean tropical years. Vol. ii. 527. iv. 396.

At Greenwich.

			° ′ ″		h. m. s.	
i.	S L	=	0 0 0·0	April 1	3 53 15·4	B.C. 973
		+	26 56 44·3	+ 27	8 6 44·6	
	S L	=	26 56 44·3	April 28	12 0 0·0	
			° ′ ″		h. m. s.	
ii.	M L. Epoch		72 32 51·407	April 29	12 0 0	A.D. 1804
	− 2776 y.	−	36 17 50·274			− 2776
			36 15 1·133			
	Corr. 27·73 C	+	2 10 32·8			
	M L	=	38 25 33·933	April 29	12 0 0	B.C. 973
	M L	=	25 14 58·906	April 28	12	

iii. S L′ iv. M L′	S L = − M L = −	° ′ ″ 26 56 44·3 25 14 58·9	April 28 12^h

					h. m. s.
D	=	1 41 45·4	=	T =	3 5 20·614
D′D″D‴D⁗	=	+ 8 13·617	=	T′T″T‴T⁗ =	+ 14 59·093
D′D″D‴D⁗D	=	1 49 59·017	=	T′T″T‴T⁗T =	3 20 19·707

		° ′ ″			h. m. s.
S L	=	26 56 44·3	v. M T	= April 28	12 0 0
D′D″D‴D⁗	=	+ 8 13·6	T T″T‴T⁗T	= +	3 20 20
S L′ = M L′	=	27 4 57·9	vi. M T′	= April 28	15 20 20

		° ′ ″		h. m. s.	
vii. A L, 3031 y.	=	51 58 22·239	April 1	3 53 15·4	B.C. 973
A L′	=	51 58 26·879	April 28	15	

		°	′	″		h.	m.	s.	
viii. P L. Epoch		42	45	2·028	April 29	12	0	0	A.D. 1804
− 2776 y.	=	−276	43	28·839					— 2776
		126	1	33·189					
Corr. 27·73 C		−8	3	16·891					
ix. P L	=	117	58	16·298	April 29	12	0	0	B.C. 973
P L′	=	117	52	31·037	April 28	15	20	20	

		°	′	″		h.	m.	s.	
xi. N L. Epoch		308	57	57·375	April 29	12	0	0	A. D. 1804.
− 2776 y.		+52	26	50·597					— 2776.
		1	24	47·972					
Corr. 27·73 C.		−1	19	54·113					
xi. N L	=	0	4	53·859	April 29	12	0	0	B. C. 973.
xi. N L′	=	0	7	37·973	April 28	15	20	20	

			°	′	″		s.	°	′	
xii.	S A	=	335	6	31·0	=	11	5	6·516	
xiii.	M A	=	269	12	26·9	=	8	29	12 26·9	Per.
						=	2	29	12 26·9	Ap.
xiv.	N D	=	26	57	19·9	=	0	26	57·33	

					h.	m.	s.
xv.	E	Argt. S A	=	+	1	43	35·5
	E′	Argt. M A′ = M A + x	=	+	9	46	48·1
	E″	Argt. S A − M A′	=	+		4	27·7
	E‴	Argt. N D	=	+		1	15·9
	E E′ E″ E‴		=	+	11	36	7·2

				h.	m.	s.	
xvi.	M T′	= April 28		15	20	20	
	E E′ E″ E‴	=	+	11	36	7·2	
	M T″	= April 29		2	56	27·2	Mean time at Greenwich.
	M T‴	= April 29		5	1	30·2	Mean time at Heliopolis.

The result of this calculation is,

		h.	m.	s.	
Mean new moon	April 28	15	20	20	Mean time at Greenwich.
	April 28	17	25	23	Mean time at Heliopolis.
True new moon,	April 29	2	56	27·2	Mean time at Greenwich.
	April 29	5	1	30·2	Mean time at Heliopolis.

xiii. New moon of August B.C. 798, for the meridian of Heliopolis in Egypt. Fourth year of the cycle of Leap-year. Epoch, April 29 at 12 h. A. D. 1803. Interval, 2600 mean Julian years. Secular correction, 25·98 centuries. Mean V. E. B. C. 4004 to mean V. E. B. C. 798, 3206 mean tropical years. Vol. iii. 457.

At Greenwich.

			°	′	″		h.	m.	s.	
i.	S L	=	0	0	0·0	March 31	13	20	15·4	B.C. 798.
			+130	3	1·786	+ 131	22	39	44·6	
	S L	=	130	3	1·786	August 10	12	0	0·0	

			°	′	″		h.	m.	s.	
ii.	M L. Epoch		289	59	11·523	April 29	12	0	0	B.C. 1803.
	− 2600 y.		− 84	49	54·349					— 2600.
			205	9	17·174					
	Corr. 25·98 C		+ 1	54	58·231					
	M L	=	207	4	15·405	April 29	12	0	0	B.C. 798.
	M L	=	124	14	23·186	August 10	12			

			°	′	″	
iii. S L′, iv. M L′ }	S L	=	130	3	1·786	} August 10 12 h.
	− M L	=	− 124	14	23·186	

D = 5 48 38·6 = T = 10 h. 35 m. 1·951 s.

D′ D″ D‴ D⁗ D‴″ = + 28 11·304 = T′ T″ T‴ T⁗ T‴″ = + 51 20·608

D′ D″ D‴ D⁗ D‴″ D = 6 16 49·904 = T′ T″ T‴ T⁗ T‴″ T = 11 26 22·559

		°	′	″		h.	m.	s.
S L	=	130	3	1·8	v. M T = August 10	12	0	0
D′ D″ D‴ D⁗ D‴″	=	+	28	11·3	T′ T″ T‴ T⁗ T‴″ T = +	11	26	23
S L′ = M L′	=	130	31	13·1	vi. M T′ = August 10	23	26	23

			°	′	″		h.	m.	s.	
vii.	A L, 3206 y.	=	54	58	24·908	March 31	13	20	15·4	B.C. 798.
	A L′	=	54	58	47·286	August 10	23	20	15·4	

			°	′	″		h.	m.	s.	
viii.	P L. Epoch		1	58	35·570	April 29	12	0	0	A. D. 1803.
	− 2600 y.	=	−315	12	11·621					— 2600.
			46	46	23·949					
	Corr. 25·98 C	=	− 7	5	37·133					
	P L	=	39	40	46·816	April 29	12	0	0	B.C. 798.
ix.	P L′	=	51	12	26·738	August 10	23	26	23	

			°	′	″		h.	m.	s.	
x.	N L. Epoch		328	20	50·327	April 29	12	0	0	A. D. 1803.
	− 2600 y.		+ 248	18	54·998					— 2600.
			216	39	45·325					
	Corr. 25·98 C		− 1	10	22·105					
	N L	=	215	29	23·220	April 29	12	0	0	B. C. 798.
xi.	N L′	=	210	0	36·795	August 10	23	26	23	

			°	′	″		s ° ′
xii.	S A	=	75	32	25·8	=	2 15 32·43

xiii.	MA	79° 18′ 46″·4	=	2s 19° 18′ 46″·4 Per.
			=	8 19 18 46·4 Ap.
xiv.	ND	280° 30′ 36″·3	=	9s 10° 30′·605

				h. m. s.
xv.	E	Argt. SA	=	− 3 34 11·2
	E′	Argt. MA′ = MA − x	=	− 9 26 17·8
	E″	Argt. SA − MA′	=	− 11·2
	E‴	Argt. ND	=	− 32·5
	EE′E″E‴		=	−13 1 12·7

xvi.	MT′	=	August 10 23h 26m 23s	
	EE′E″E‴	=	— 13 1 12·7	
	MT″	=	August 10 10 25 10·3	Mean time at Greenwich.
	MT‴	=	August 10 12 30 13·3	Mean time at Heliopolis.

The result of this calculation is,

Mean new moon,	August 10	23h 26m 23s	Mean time at Greenwich.
	August 11	1 31 26	Mean time at Heliopolis.
True new moon,	August 10	10h 25m 10s·3	Mean time at Greenwich.
	August 10	12 30 13·3	Mean time at Heliopolis.

xiv. Mean new moon of February, (O. S.) A. D. 1654, for the meridian of Heliopolis in Egypt. Third year of the cycle of Leap-year. Epoch, April 29 at 12 h. A. D. 1802. Interval, 148 mean Julian years. Secular correction, 1.47 centuries. Vol. iii. 525.

At Greenwich.

i.	SL =	0° 0′ 0″·0	March 12 7h 27m 5s·8	A. D. 1654
	−	33 19 30·751	−33 19 27 5·8	
	SL =	326 40 29·249	Feb. 6 12	

ii.	ML. Epoch	160° 36′ 6″·667	April 29 12h 0m 0s	A. D. 1802
	− 148 y. −	196 27 34·755		− 148
		324 8 31·912		
	Corr. 1·47 C.	+ 23·110		
	ML =	324 8 55·022	April 29 12 0 0	A. D. 1654
	ML =	323 41 2·808	Febr. 6 12	

iii. SL′ / iv. ML′ }	SL =	326° 40′ 29″·249	} Febr. 6 12 h.
	−ML = −	323 41 2·808	
	D =	2 59 26·441 =	T = 5h 26m 50s·414
D′D″D‴D⁗D′′′′′	=	+ 14 30·485 = T′T″T‴T⁗T′′′′′ =	+ 26 25·535
D′D″D‴D⁗D′′′′′ D +		3 13 56·926 = TT″T‴T⁗T′′′′′T =	+ 5 53 15·949

	° ′ ″		h. m. s.
SL =	326 40 29·249	v. MT = Feb. 6	12 0 0
	+ 14 30·485	T′T″T‴T⁗T‴″T =	+ 5 53 16
SL′ = ML′ =	326 54 59·734	vi. MT′ = Feb. 6	17 53 16

			h. m. s.	
vii.	MT′ =	Feb. 6	17 53 16	Mean time at Greenwich.
			+ 2 5 3	
	MT″ =	Feb. 6	19 58 19	Mean time at Heliopolis.

The result of this calculation is,

		h. m. s.	
Mean new moon,	Feb. 6	17 53 16	Mean time at Grenewich.
	Feb. 6	19 58 19	Mean time at Heliopolis.

xv. Mean new moon of March (O. S.) A. D. 1802, for the meridian of Heliopolis in Egypt. Third year of the cycle of Leap-year. Epoch, April 29 at 12 h. A. D. 1802. Vol. iii. 527.

		° ′ ″	*At Greenwich.*	h. m. s.	
i.	SL =	0 0 0·0	March 11	3 55 25·0	A. D. 1802.
	+	10 11 17·370	+ 10	8 4 35	
	SL =	10 11 17·370	March 21	12 0 0	

		° ′ ″		h. m. s.	
ii.	ML. Epoch	160 36 6·667	April 29	12 0 0	A. D. 1802.
	ML =	6 43 20·614	March 21	12	

		° ′ ″	
iii. SL′ / iv. ML′	SL =	10 11 17·370	March 21 12 h.
	− ML =	− 6 43 20·614	

			h. m. s.
D =	3 27 56·756 =	T =	6 18 45·648
D′D″D‴D⁗D‴″D‴‴ =	+ 16 48·769 =	T′T″T‴T⁗T‴″T‴‴ =	+ 30 37·408
D′D″D‴D⁗D‴″D‴‴D =	3 44 45·525	T′T″T‴T⁗T‴″T‴‴T =	6 49 23·056

	° ′ ″		h. m. s.
SL =	10 11 17·370	v. MT = March 21	12 0 0
D′D″D‴D⁗D‴″D‴‴ =	+ 16 48·769	T′T″T‴T⁗T‴″T‴‴T	+ 6 49 23
SL′ = ML′ =	10 28 6·139	vi. MT′ = March 21	18 49 23

		h. m. s.	
vii.	MT′ = March 21	18 49 23	Mean time at Greenwich.
		+ 2 5 3	
	MT″ = March 21	20 54 26	Mean time at Heliopolis.

The result of this calculation is,

		h. m. s.	
Mean new moon,	March 21	18 49 23	Mean time at Greenwich.
	March 21	20 54 26	Mean time at Heliopolis.

Lastly, in order to illustrate that part of our subject, in which we were explaining the names given to the signs of the sphere, at the epoch of the second Phœnix Period, and the reasons into which they were probably to be resolved; and more especially the name of the ninth sign[o]; we have calculated the actual lengths of the months of the celestial calendar, and of the four quarters of the natural year, for three epochs: B. C. 1847, the date of the first Phœnix Period; B. C. 1347, that of the second; and B. C. 798, which is virtually the same as B. C. 847 or 848, that of the third.

i. Ingresses of the sun into the twelve months of the calendar of Mazzaroth, for the meridian of Heliopolis, and lengths of the months and of the four Quarters, B. C. 1847–46.

B. C. 1847—46.				I. QUARTER.			LENGTHS.			
				h.	m.	s.	d.	h.	m.	s.
i Krion ..	April	7		6	38	58·190	31	10	35	47·642
ii Tauron ..	May	8		17	14	45·832	31	8	55	47·987
iii Didymon ..	June	9		2	10	33·819	31	3	45	32·761
				II. QUARTER.			LENGTHS.			
				h.	m.	s.	d.	h.	m.	s.
i Karkinon ..	July	10		5	56	6·580	30	19	1	30·284
ii Leonton ..	August	10		0	57	36·864	30	7	48	7·190
iii Parthenon ..	September	9		8	45	44·054	29	21	0	44·924
				III. QUARTER.			LENGTHS.			
				h.	m.	s.	d.	h.	m.	s.
i Zygon ..	October	9		5	46	28·978	29	13	44	43·793
ii Scorpion ..	November	7		19	31	12·771	29	8	48	6.774
iii Toxon ..	December	7		4	19	19·545	29	13	30	29·106
				IV. QUARTER.			LENGTHS.			
				h.	m.	s.	d.	h.	m.	s.
i Ægon ..	January	5		17	49	48·701	30	1	0	37·886
ii Hydron ..	February	4		18	50	26·587	30	14	42	57·186
iii Ichthyon ..	March	7		9	33	23·773	31	2	53	45·858

		LENGTHS.			
		d.	h.	m.	s.
B. C. 1847—46.	i. Quarter	93	23	17	8·390
	ii. —	90	23	50	22·398
	iii. —	88	12	3	19·673
	iv. —	91	18	37	20·930
		365	5	48	11·391

ii. Ingresses of the sun into the twelve months of the calendar of Mazzaroth, for the meridian of Heliopolis, and lengths of the months and of the four Quarters, B. C. 1347–46.

[o] Vol. iii. 384. Diss. xv. ch. vi. sect. x.

B. C. 1347—46.			I. QUARTER.	LENGTHS.
			h. m. s.	d. h. m. s.
i Krion	..	April 3	4 20 11·628	31 8 43 30·195
ii Tauron	..	May 4	13 3 41·823	31 10 19 2·068
iii Didymon	..	June 4	23 22 43·891	31 5 44 2·817
			II. QUARTER.	LENGTHS.
			h. m. s.	d. h. m. s.
i Karkinon	..	July 6	5 6 46·708	30 22 2 39·870
ii Leonton	..	August 6	3 9 26·578	30 11 7 13·054
iii Parthenon	..	September 5	14 16 39·632	29 23 43 24·175
			III. QUARTER.	LENGTHS.
			h. m. s.	d. h. m. s.
i Zygon	..	October 5	14 0 3·807	29 15 2 26·752
ii Scorpion	..	November 4	5 2 30·559	29 9 48 29·950
iii Toxon	..	December 3	14 51 0·509	29 11 24 55·450
			IV. QUARTER.	LENGTHS.
			h. m. s.	d. h. m. s.
i Ægon	..	January 2	2 15 55·959	29 21 28 18·197
ii Hydron	..	January 31	23 44 14·156	30 10 47 29·667
iii Ichthyon	..	March 3	10 31 43·823	30 23 36 44·115

		LENGTHS.
		d. h. m. s.
B. C. 1347—46.	i. Quarter	94 0 46 35·080
	ii. —	91 8 53 17·099
	iii. —	88 12 15 52·152
	iv. —	91 7 52 31·979
		365 5 48 16·310

iii. Ingresses of the sun into the twelve months of the calendar of Mazzaroth, for the meridian of Heliopolis, and lengths of the months and of the four Quarters, B. C. 798-97.

B. C. 798—97.			I. QUARTER.	LENGTHS.
			h. m. s.	d. h. m. s.
i Krion	..	March 29	23 24 14·704	31 6 9 53·879
ii Tauron	..	April 30	5 34 8·583	31 10 53 22·006
iii Didymon	..	May 31	16 27 30·589	31 7 28 18·173
			II. QUARTER.	LENGTHS.
			h. m. s.	d. h. m. s.
i Karkinon	..	July 1	23 55 48·762	31 1 7 28·693
ii Leonton	..	August 2	1 3 17·455	30 14 48 52·720
iii Parthenon	..	September 1	15 52 10·175	30 3 3 18·770
			III. QUARTER.	LENGTHS.
			h. m. s.	d. h. m. s.
i Zygon	..	October 1	18 55 28·945	29 17 2 4·955
ii Scorpion	..	October 31	11 57 33·9	29 11 11 2·637
iii Toxon	..	November 29	23 8 36·537	29 9 47 38·875

		IV. QUARTER.				LENGTHS.			
			h.	m.	s.	d.	h.	m.	s.
i Ægon	.. December 29		8	56	15·412	29	18	0	6·904
ii Hydron	.. January 28		2	56	22·316	30	6	32	4·152
iii Ichthyon	.. February 27		9	28	26·468	30	19	44	9·416

		LENGTHS.			
		d.	h.	m.	s.
B.C. 798—97.	i. Quarter	94	0	31	34·058
	ii. —	91	18	59	40·183
	iii. —	88	14	0	46·467
	iv. —	90	20	16	20·472
		365	5	48	21·180

The explanation which we proposed of the name given to the sixth sign (Virgo[p]) is such, we are persuaded, as must recommend itself to the judgment of any of our readers, by its own probability. We have lately however met with the Horæ Ægyptiacæ of Mr. Poole[q]; from which we have learnt that among the Copts of Egypt, (i. e. the only survivors of its aboriginal population,) the name still given to the ceremony of cutting the canals, and letting out the water, and particularly the largest of them, and that which is the first to be opened, the canal of Cairo, is the "Bridal of the Nile[r]:" which we think is a striking confirmation of the truth of our explanation, if it is considered to require any further confirmation at all. Mr. Poole also states that according to the Egyptian almanacs this ceremony of the Bridal (in other words the cutting of the canals) anciently had a stated date; which he represents as about a month before the autumnal equinox. It is much to be regretted that he has not produced one of these dates from the almanacs in question, that we might have formed an opinion about it for ourselves. The autumnal equinox at present in the Coptic calendar must be found to bear date September 10 or 11 Old Style, September 22 or 23 New Style; and the canals are cut at present also, about July 29 Old Style or August 10 New Style[s]. We have little doubt ourselves that, were the truth known on this point, it would be found that this ceremony of the mystical Bridal was originally attached to the entrance of the sun into Virgo, according to the calendar of Mazzaroth, August 24[t]: which B. C. 1847, as the above scheme shews, was almost the mid-

p iii. 378. Diss. xv. ch. vi. sect. viii.

q Horæ Ægyptiacæ. By Reginald Stuart Poole. London (Murray), 1851. 8vo.

r P. 4. part i. section i.

s Vol. iii. 22. Diss. xiv. ch. i. sect. viii. and note.

t Vol. iii. 305. Diss. xv. ch. iv. sect. viii.

dle term between the date of the summer solstice July 9 or 10, and that of the autumnal equinox, Oct. 8 or 9: 45 days distant from each. The rule in Egypt from time immemorial appears to have been to let out the waters about the middle of the summer quarter; half way between the solstice, when the Nile was supposed to begin to rise, and the equinox, when it was supposed first to begin to subside. In the third scheme of the mansions[v], that of B. C. 848, the xiith mansion as we have seen, bore the name of Statio Amoris; and its date (after B. C. 672) was August 22; only one day earlier than the date of the ingress into Virgo at that time also, August 23. This is explained at once, if the ceremony of the Bridal always took place in this mansion.

The tradition which appears to have been once current in Egypt of the annual sacrifice of a virgin to the Nile (to which Mr. Poole refers) might obviously be founded on the mystical signification of this name of the sixth Sign, and on this annual ceremony of the mystical Bridal. It is an inversion of the natural order and association of these things, to derive the ceremony of the Bridal from this tradition, and not rather this tradition from that ceremony. We have no reason indeed to believe that a virgin was ever actually sacrificed on these occasions; though the fact of human sacrifices in Egypt of one kind or other has been asserted by some of the ancients. But we think it far from improbable that a virgin in effigy, as the type of the land of Egypt or as the type of Isis, some time or other did make a part of this ceremony of the Bridal; and might be purposely thrown into the Nile in that character.

We embrace this opportunity also of explaining that Abraham Zacuth, to whom we are indebted for a very important testimony relative to the Phœnix period of antiquity[x], was not the person whom we there represented him to be, the Arabian Ibrahim surnamed Zagiag. This Abraham was a Jewish Rabbi (Ben Samuel) born at Salamanca in Spain; and in 1492 Professor of Astronomy at Sarragossa. Flamsteed has quoted an observation of Spica Virginis made by him in 1474[y]. When the Jews were expelled from Spain by Ferdinand and Isabella, he retired to Lisbon; where he was named Professor and Historiographer Royal by the contemporary king Emmanuel[z]. The title of his work is *Sepher Yuchasin*, or Juchasin; i. e. Book of Genealogies: and it contains a system of chronology from the

v iii. 552. 583, 584.

x iii. 242, 243. Diss. xv. ch. ii. sect. v.

y Historia Cœlestis Britannica, Prolegomena, 39. Opp. iii. This however was no doubt taken from Riccius, De Octava Sphæra.

z See the Biographie Universelle, Bruxelles, 1843—47. In nomine.

Creation to A.D. 1500. He was undoubtedly a learned man; and he has been often referred to.*

We are not aware of any thing of material importance in the preceding parts of this work, which still requires to be revised and

* This Abraham Zacuth was Riccius' (or Ricius') own preceptor in astronomy; and he gives him an high character for his skill in that science above any other person in his time. It appears however from Riccius also that Zacuth was not the first author of the statement in question, but Isaac the Jew, an older writer (of the 11th century) in his work, De Mundi Fundamento; to which also Bailly referred; and we after Bailly.

We think it worth while to extract from Riccius' treatise, De Octava Sphæra, what he actually says on this subject; and to give it in his own words.

A. Ricii De Motu Octavæ Sphæræ, (Lutetiæ, Simon Colinæus, 1521,) p. 23: Qui autem hunc solum motum Octavæ Sphæræ adscripsere, Alzarchel scilicet atque Thebit, hoc moti argumentati sunt, quoniam ex antiquis quosdam invenerunt (quorum præcipuus Hermes fuisse creditur, teste Ishac Israelita tractatu secundo, cap. 6, De Mundi Fundamento), qui loca stellarum fixarum magis ab Arietis capite scripserunt quam sint a Ptole. reperta. Vulturem enim cadentem Ptol. septima Almagesti in vigesimum minutum 17 gradus Sagittarii collocavit, quem Hermes in eo libello quem de stellis heibernis conscribit in 24 gradu ejusdem signi situm esse ait. idem in quam plurimis aliis fecisse Hermetem reperitur: stellam enim lucidam hidræ, quam Alfard Arabes dicunt, in septimo gradu Leonis esse dixit, quæ apud Pto. in fine ultimi gradus Cancri inventa est. idem de cauda gallinæ, humero equi, vulture volante, et aliis videre licet. Ishac quoque eodem loco ait Alzarchelem invenisse scriptum ab Hermete stellam cordis Leonis etiam in majori distantia deprehensam fuisse a puncto æquinoctii vernalis quam fuerit a Ptolemæo inventa; ideoque motum trepidationis in octava sphæra posuisse. is autem Hermes Ptolemæo mille noningentis et octoginta quinque annis antiquior fuit: sicuti in epistola de astronomiæ inventoribus declaravimus.

It appears to be implied in this account, that the ultimate authority for the reference to Hermes in question was either Thebeth or Alzarchel, or both. The age of Thebeth is known from observations made by him A.D. 830—832. Alzarchel was a Spanish Arabian (of Toledo in Spain) author of Tables called those of Toledo, after him; whom Bailly makes 190 years later than Albatanius; i. e. than A.D. 882 or 883: consequently A.D. 1072 or 1073. (Astronomie Moderne, i. 235. Liv. vi. §. xviii.) But they must have known of some book ascribed to Hermes; the real author of which was probably an Egyptian, well acquainted with the true nature and constitution of the Phœnix period of antiquity among his countrymen: though his own age, whosoever he was, does not appear to have been older even than the time of Ptolemy. Cf. supra, vol. iii. 436, note.

Ricius, Lib. cit. p. 29: Præterea anno 1474 incarnationis, hoc est post Alphonsum annis 223 fere, Abraham Zacuth, quem præceptorem in astro-

explained or corrected, except the calculations which were proposed in illustration of the original date of the lunar mansions among the Egyptians[a], April 8 B. C. 1847; and in illustration of Alkaswini's scheme of the Arabian mansions, and of its epochal or initial date, April 18 A. D. 1260[b]; and of that of Ulugh Beigh, referred to the epoch of A. D. 1419[b]. The original date of the mansions for the meridian and latitude of Heliopolis, we believe to have been well ascertained. Nor is there any thing to correct in that amended synopsis of Alkaswini's scheme which we proposed supra[b]. But in recovering the primary date of the scheme in his time, or in that of Ulugh Beigh, from the date of origination, April 8, considered as a Julian date given in terms and fixed ever after, we fell into a mistake; viz. that of assuming that the Precession of the mean Sidereal year on the actual Julian year and on a given term in that year, after B. C. 672, required to be diminished by two days. The proper amount of this diminution, since B. C. 672, and at present, is *one* day[c]: and at that we ought to have assumed it*.

The internal evidence of Kazwini's own account of the mansions, as we have already pointed it out, must satisfy us that though he himself was a native of Irak, and probably wrote the account in question at Casbin, his scheme is simply the Arabian; and this Arabian is simply the Egyptian: with no other change in its proper Egyptian form and constitution but that of the initial mansion, and of the epochal stars in that mansion, and of their proper place in the mansion itself. The epochal stars in the original scheme of the Egyptians were 27 Arietis, and the rest; which composed the constellation Al-Botein: those in the Arabian modification of this scheme appear to have been always γ and β Arietis, the stars which were called Al-Sheratân or Al-Shartân.

The most westernly of these two is γ Arietis. And according to

nomia habuimus, in civitate Salamanchæ lunam vidit Assimech (Al Simâk) i. e. Spicam Virginis non multum a medio cœli distantem cooperuisse.

P. 35: Hanc eandem sententiam Abraham Zacuth, vir nostra ætate in hac arte singularis, &c.

P. 7: Habraham Zacuth, astronomiæ nostra tempestate peritissimus, &c.

* For this reason in the scheme of the Lunar mansions, (vol. iii. 552: 555:) the Julian dates attached to Type iv, that of A. D. 1802, are one day too low all through. The first should be April 30: and all the rest one day higher in proportion.

[a] Vol. iii. 339—344. Diss. xv. ch. v. section vi.

[b] Ibid. [b] 607—612.

[c] See the Introduction to the Tables, 245—251. Part iii. ch. i. section xvi.

Flamsteed[d], A. D. 1689 exeunte, it stood in 28° 51′ east longitude, 7° 8′ 58″ north Lat. The mean vernal equinox of our Tables, A. D. 1689, corrected, for their own meridian bore date March 11, 21h. 17m. 16·8s; for that of Heliopolis, March 11, 21h. 1m. 32·8s: and this was 295 days before Dec. 31, at the end of the year. The longitude then of γ Arietis Dec. 31, at mean noon, A. D. 1689, being 28° 51′; 295 days before, at the mean V. E. March 11, mean noon, it was 40″·440° less: that is, 28° 50′ 19″·560.

The number of mean tropical years from the mean V. E. A. D. 1689 to the mean V. E. B. C. 1847 was 3535: and in this number of mean tropical years precession with our mean standard annually would = 49° 9′ 55″·828. We have then,

		°	′	″
Longitude of γ Arietis at the mean V. E.	A. D. 1689	28	50	19·560
Precession	− 3535 = −	49	9	55·828
Longitude of γ Arietis at the mean V. E.	B. C. 1847 =	339	40	23·732
Longitude of mansion xxvii, Type i. (= mansion xxviii, Type iii.)	B. C. 1847 =	334	17	8·571
Longitude of γ Arietis in mansion xxvii,	B. C. 1847 =	5	23	15·161

It is manifest therefore that a scheme of the mansions, B. C. 1847, of which γ Arietis should have been constituted the epochal or initial star, instead of 2τ Arietis, but in other respects the same with that which actually took its rise in that year, attached to the epoch of April 8, and to the first degree of mansion i. of Type i. must have been graduated critically from the 6th degree of the xxviith mansion of Type i; which was the same as the xxviiith of Type iii: and in this Type and in the Arabian scheme of this Type bore the name of Al-Rishâ. And according to the cyclical rule of the mansions one degree being reckoned equivalent to a day; if the date of the first degree of mansion i, Type i, was April 8 at a certain time, that of the first degree of mansion xxvii, Type i, would be 26 days earlier, March 13 at the same time: and the date of the 6th degree of that mansion, cyclically reckoned also, would be March 18 at the same time. The Egyptian epoch of these ingresses, according to the cyclical rule in question, appears to have been noon; that of the Arabian scheme of the same kind must have been dawn or day-break: or, as a general rule, about an hour or somewhat more before sunrise all round the year. The Julian epoch of the Arabian scheme being assumed accordingly, as March 18 at this time, B. C. 1847; it is easy to recover from it the epochal or initial date of Al-Kaswini's scheme A. D. 1260.

[d] Catalogus Britannicus, Pag. 1. App. iii.

For, on this principle, we have the sun in conjunction with γ Arietis, B. C. 1847,

	March 18 at day-break.
3106 years' sidereal precession on a given Julian date, diminished by unity, in integral days[e],	+ 18
Sun in conjunction with γ Arietis A. D. 1260	April 5 at day-break.
One mansion	+ 13
Sun in conjunction with 2τ Arietis, Rising of γ Arietis at day-break.	April 18 at day-break.

When the sun is in conjunction with a particular star, that is, when it has the same longitude as that star, the star must be invisible any time in the morning before sunrise. It is manifest therefore that April 5 at day-break A. D. 1260 would not be the date of the visible manifestation of γ Arietis; i. e. of Al-Sheratân. The proper date of that phenomenon, according to the cyclical rule, must be 13 days or one mansion later; when the sun would be similarly in conjunction with the epochal stars of Al-Botein: that is, April 18 at day-break. And this *is* the date which Al-Kaswini assigns it.

The sun's true place (S L') at sunrise on the morning of April 18, A.D. 1260, for the meridian of Casbin being assumed at 35° 19′ 16″; the obliquity, A. D. 1260, at 23° 32′ 2″; and the latitude of Casbin at 36° 11′ N; we have calculated the time of true sunrise for that day: and found it to be 5 h. 20 m. 1·5 sec. apparent time on the morning of April 18, exclusive of refraction. The longitude of γ Arietis at this time according to Flamsteed was 22° 52′ 20″, or about 23° exactly; and it may be seen from the globe at once that, if 35° 19′ 16″ was rising with the sun at 5 h. 20 m. 2 sec. apparent time, 23° east longitude and 7° 8′ 58″ N. L. would rise about 80 minutes before it: i. e. as nearly as possible at the dawn of day. So that in this respect the scheme of Al-Kaswini dated from the rising of the first of its epochal stars γ Arietis, the most westernly of the Arabic Shartân of the sphere, April 18, A. D. 1260, would be true even for his own latitude, that of Casbin; which is probably the reason why he has proposed it without qualification of any kind, as if for his own latitude: though in reality it is simply the Arabian grafted on the Egyptian. For that the characters of the scheme, even in his own account of it, are those of the Arabian and of the Egyptian, it does not appear to us to be possible to deny.

We learn therefore from this scheme of Al-Kaswini's that, when the mansions passed from the Egyptians to the Arabians, they set back the epoch to the 6th degree of the xxviith of Type i, the xxviiith of

[e] Vol. iii. 610.

Type iii; because that was the place of γ Arietis, the first of the two stars of Aries, which they pitched upon to serve as the Shartân or epoch of their own scheme. We have often explained that the epoch of a particular star in a particular mansion, in a sidereal not a lunar scheme of that kind, once fixed must remain ever after the same; the star and the mansion being each liable to be affected alike by precession. Accordingly the epoch of γ Arietis is still the sixth degree of mansion xxvii = mansion xxviii. The longitude of this mansion, A. D. 1802, was

		°	′	″
		25	1	22·257[f]
Add	..	5	23	15·161
Longitude of γ Arietis A. D. 1802	..	30	24	37·418
		°	′	″
Longitude of γ Arietis A. D. 1689	..	28	50	19·560
Precession, 113 y. ..	..	1	34	17·86
Longitude of γ Arietis A. D. 1802	..	30	24	37·42

We learn from it also that the Arabians did not give the name of Al-Sheratân to this xxviith mansion of Type i, the xxviiith of Type iii; though the epoch of the scheme was attached to the sixth degree of that mansion; and the locus of γ Arietis itself was in that degree at the time, and ever after: but to the next to it. And the reason of this distinction must now appear; viz. That that mansion was called and considered Al-Sheratân in which these Shartân, γ and β Arietis, first became visible. The same reason no doubt determined the name of the second mansion, Al-Botein. It was so called because Al-Botein, the stars of "the little belly," 2τ Arietis and the rest, first appeared in that mansion, rising at day-break. In short, this rule no doubt went round the sphere, with the whole cycle of mansions. It follows that, on this principle, the names of the mansions in the Arabian scheme looked backwards, not forwards, (*in antecedentia* not *in consequentia*,) all through.

With regard to Ulugh Beigh's account of the mansions, we have already remarked that, though the epoch of his own Tables is actually attached to A. D. 1437; he sets back that of the mansions to A. D. 1419: but we have also remarked that A. D. 1419 stood just at the distance of one day's precession of the mean Sidereal year on the mean or actual Julian, from A. D. 1260. It is agreed that Ulugh Beigh has made great use of the Tables of Nassir-Eddin, and in many respects copied them implicitly. These Tables of the Persian astronomer were adapted to the meridian of Meragah, Marâja,

[f] Vol. iii. 552.

or Maregah—a considerable city of the province of Aderbigjân (the ancient Media) in his time; and not far from the modern Hamadan which represents the ancient Ecbatana. The observatory founded by him in 1260 or 1261 stood on an hill, outside of that city. In his Tabulæ Geographicæ[g] it is placed in east longitude 82°; north lat. 37° 20′: as Kazwin is in east longitude 85°; north lat. 37°: and Samarkand in east longitude 98° 20′; north lat. 40°: of which statements Ulugh Beigh[h] corrects only the last, relating to Samarcand, his own city and his own observatory, 99° 16′ east long.; 39° 37′ north lat.

The latitude of Nassir-Eddin's own place of observation is probably correctly assigned by him. If so, there was 7° 18′ difference between that and the latitude of Memphis in Egypt, 30° 2′ N.: and a difference of 7° 18′ in that respect would make a difference of seven days in the respective dates of the same phenomenon, the heliacal rising of a given star, for different latitudes. On this principle, even though the Arabico-Egyptian scheme of the mansions had passed to Nassir-Eddin attached to the 6th degree of the xxviith mansion of Type i; yet to accommodate it to the latitude of his own observatory, on strictly astronomical principles, it would have to be attached to the 13th degree. And, supposing this to have been done by Nassir-Eddin, and the change so made by him to have been simply retained by Ulugh Beigh, we can easily recover from it Ulugh Beigh's date of the rising of Al-Sheratân A. D. 1419.

For on this principle we have

i. The Arabian epoch, in the 6th degree of Mansion xxvii	March 18 at dawn,	B. C. 1847
	+ 7	
ii. The Persian, in the 13th degree	March 25 at dawn,	B. C. 1847
Precession, 3265 years, in integral days, diminished by unity[i]	+ 20	− 3265
Epoch of the 1st Mansion in the Persian scheme	April 14 at dawn,	A. D. 1419
One mansion	+ 13	
Epoch of the 2nd Mansion, Rising of Al Sheratân.	April 27 at dawn.	

The sun would be in conjunction with Al-Sheratân on April 14: but they would *then* be necessarily invisible. April 27 it would be in conjunction with Al-Botein; and *then* Al-Sheratân would begin to appear in the morning twilight: which is entirely agreeable to

g Geographi Minores, iii. Nassir Eddin Ettusæi Tabulæ Geographicæ, 99. 109.
h Ibid. p. 215.
i Vol. iii. p. 342.

Ulugh Beigh's own statement, that "in anno Alexandreo 1730 (A. D. 1419) ortus τοῦ Sheratein erat in vicesimo sexto mensis Nisân[k]:" this 26th of Nisan or April being reckoned from noon April 26 to noon April 27, according to the proper rule of the astronomers followed by Ulugh Beigh.

Assuming the sun's true place (SL′) at sunrise, April 27, for the meridian of Samarcand, A. D. 1419 to have been 44° 28′ 2″, the obliquity A. D. 1419 to have been 23° 30′ 49″; and the latitude of Samarcand to have been 39° 37′ N., we have calculated the time of true sunrise there, on the morning of this day; and found it 5 h. 4 m. 14 sec. apparent time exclusive of refraction; and it may be seen from the globe that γ Arietis, in 26° east long., 6° 36′ N. L. (according to Ulugh Beigh's own Tables) at that time must have risen 1 h. and 30 min. earlier. Ulugh Beigh's observation therefore, referred to the date of the rising of Al-Sheratein A. D. 1419, would be almost as true for his own latitude, as for that of Meragah: though we have little doubt that it is first and properly to be understood of the latter.

A work has been recently printed at the University Press, Oxford; edited by Emmanuel Miller, from a MS. in the National Library at Paris: and entitled Ὠριγένους Φιλοσοφούμενα, ἢ κατὰ πασῶν αἱρέσεων ἔλεγχος. The latter part of this title describes its nature and contents, as well as its professed object, very correctly; the first part ascribes it to Origen: and the learned editor believes it to be a genuine work of Origen's. We shall not however be singular if we observe that, after the perusal of the work itself, we have been convinced by its internal evidence, (confirmed by other considerations,) that its real author was Hippolytus, bishop of Portus Romanus, and martyr in the persecution under Decius A. D. 249–251. In fact, we consider it to be the identical work which the ancients ascribe to him, under the title of Κατὰ πάσας τὰς αἱρέσεις, or Κατὰ πασῶν τῶν αἱρέσεων. It is not necessary however for us to enter here into the question which has already been raised, concerning the author. We have no doubt that time and the deliberate judgment of learned and impartial readers will decide this question at last; and decide it rightly.

There is much curious matter in this work; and much which is important even to our proper subject, as well as new, and such as we have met with no where else: of which we may possibly make use on a future occasion. At present we observe simply, i. That

[k] iii. 339, 340.

from a fragment, (apparently of Pindar's,) cited by it[k], we learn that Hiarbas the Libyan, to whom we have seen reason to attribute the correction of the calendar of the Ammonians[l], passed with the Libyans for the first-born of the human race; the explanation of which is not that he was a purely mythological character, who never had a real existence, but that he was the first and oldest of their reformers, legislators, or teachers: particularly that he was the author of their religious system, and possibly of their peculiar system of time.

ii. We learn from it[m] that the Dekas was considered by the Egyptians as a second Monas, and another beginning of number as much as that. It confirms therefore the conclusion to which we came[n], that the same hieroglyphical symbol, the circle or oval, which denoted the Monas, had the power of denoting the Dekas also.

iii. It corroborates by its testimony[o] the universality of that distinction of things by the Egyptians into two correlative elements or principles, a masculine and a feminine, which we illustrated from Seneca[p]; a distinction, which in their system pervaded the universe of nature, sensible and insensible, animate and inanimate, alike: the most probable and consistent explanation of which however is the peculiar relation of their Osiris and their Isis to each other, and to every thing else: the former being the type of the masculine principle every where and in every thing, the latter that of the feminine.

Lastly, there is an observation in this book, Ὄσιριν δὲ λέγουσιν ὕδωρ[q], which shews that Osiris and the aqueous principle in Egypt, or in the opinion and judgment of the learned of the author's time, were much the same thing; as Hermæus had been taught to consider them in Egypt itself[r]: and as we ourselves have collected from the circumstances of the last day of the Isia[s].

We shall conclude with briefly adverting to two more corrections, which are still necessary.

First, the Gregorian date of the mean Vernal Equinoxes, corresponding to the Julian perpetually, which we exhibit in Division C of our General Tables, requires no correction from Period i. down to the Ingress of Period xxviii; but at the Ingress of that Period, B.C. 672, the Julian date rising from March 29 to March 30, the Gregorian must rise from April 25 to April 26. As it was, we lowered it, at the Ingress of that Period, from April 25 to April 24;

k Lib. v. cap. 7. P. 97. § 85.
l Fasti, iv. 255.
m Lib. iv. Cap. 43. P. 77 § 95.
n Fasti, iv. 293, 294, note.
o Lib. iv. Cap. 43. P. 76—79.
p iii. 108, note.
q Lib. v. Cap. 7. p. 101 § 5.
r Fasti, iii. 166.
s iii. 128.

but it will now be seen that it ought to be raised from April 25 to April 26. And that being done, no change will be requisite in the cycle of the Dominical letter, which accompanies the Gregorian equinox perpetually. April 26 Dom. Lett. A is the same feria of the hebdomadal cycle as March 30 Dom. Lett. B; and each is the feria quarta.

A slight correction is also necessary in the details of the Cycle of the Meridian Restitution, of which an account is given page 229 of the Introduction to the Tables, and which constitutes the xxviith of the Supplementary Tables. It was assumed in that cycle that the effect of the two miracles was to depress the Right Ascension in A, 180°, on each occasion; but it must now be evident that neither of them would make any difference in that respect, at least in terms: nor consequently affect the details of that Table apparently in any the least degree. It makes no difference to the Restitution itself, whether it did, or did not; because, as we observed, the effect in any case was limited to 24 hours. We subjoin therefore the correction required by this Table, as far as it extends.

Correction of Table xxvii. (Supplementary Tables, p. lxxviii.) *or Cycle of the Meridian Restitution.*

Period	A.M.	B.C.	A	Aa	B	Bb
			° ′ ″	h. m. s. t.	° ′ ″	h. m. s. t.
xx	2452	1553	268 55 12	17 55 40 48	91 4 48	6 4 19 12
xxi	2581	1424	359 0 36	23 56 2 24	0 59 24	0 3 57 36
xxii	2710	1295	89 6 0	5 56 24 0	270 54 0	18 3 36 0
xxiii	2839	1166	179 11 24	11 56 45 36	180 48 36	12 3 14 24
xxiv	2968	1037	269 16 48	17 57 7 12	90 43 12	6 2 52 48
xxv	3097	908	359 22 12	23 57 28 48	0 37 48	0 2 31 12
xxvi	3226	779	89 27 36	5 57 50 24	270 32 24	18 2 9 36
xxvii	3355	650	179 33 0	11 58 12 0	180 27 0	12 1 48 0

We observe that, page 520 *supra*, we have inadvertently spoken of the mean anomaly, as if it were the difference of the mean place, at a given time, and the true; though every astronomer knows that the mean anomaly is the angular distance of a planetary body, supposed to be moving with an uniform velocity, from the Perihelion or the Aphelion of its proper orbit. It is the difference of SL′ and AL′, or of ML′ and PL′, as we have used those symbols, perpetually. And

here we might close these explanations. But we have recently been favoured with a very valuable communication from Mr. Adams of St. John's college Cambridge; and, as he has also given us permission to make it public, we should not be justified in withholding it from our readers.

The discovery lately made by Professor Hansen, (Director of the Observatory of Seeberg,) of a perturbation of the moon, the period of which is of very considerable length, and the effect of which heretofore was confounded with the mean motion; and an accurate reduction of the lunar observations at Greenwich by the Astronomer Royal, Mr. Airy; have led to the conclusion that the secular motion of the moon (ML) at the beginning of the present century was really 39″ greater than Damoiseau assumed it to be.

It follows that the mean longitude of our xivth Supplementary Table (Introduction, page xxiii) requires a correction of $39'' \times \kappa$; or $39'' \times$ by the number of centuries: which in going back from A. D. 1801 will have to be subtracted from the value of ML found from that Table.

In like manner the mean longitude found from our xviith Table (page xxvii) that of the Perigee, (PL,) requires a correction of $31'' \times \kappa$, or 31″ multiplied by the number of centuries: which must be subtracted from the value of PL found from that Table before A. D. 1801.

So likewise the mean longitude of the Node (NL) found from our xxth Table (page xxxi) requires a correction of 63″ multiplied by the number of centuries, or κ; which must be subtracted from NL found from that Table, before A. D. 1801.

This correction of the mean longitude A. D. 1801 entails a correction of the mean synodic standard of that epoch also. The standard determined by Mr. Adams is

29 d. 530 588 136 66 or
29 d. 12 h. 44 m. 2·815 002 24 sec.

though he recommends that it should be taken at 29 d. 12 h. 44 m. 2·815 sec., because the value of this latter decimal cannot be depended on beyond the third place.

The same distinguished Astronomer having very obligingly gone into the intricate calculation of the secular inequalities of the moon, and by a method which takes into account every term in the series of the powers of κ, has furnished us also with a new formula for the secular correction of the mean longitude, (i. e. of ML,) found from

our xivth Table as above directed; and one which includes the fourth power of κ.

$$+\ 10''{\cdot}526\,03 \times \kappa^2$$
$$-\ 0''{\cdot}012\,719\,6 \times \kappa^3$$
$$-\ 0''{\cdot}000\,064\,644\,2 \times \kappa^4.$$

In the application of this to any epoch anterior to A.D. 1801, the sum of the two latter terms must be subtracted from the first; and the remainder, with a *positive* sign, will be the secular correction of ML, found from our xivth Table, at κ centuries before A.D. 1801.

With regard to the other two corrections; the secular correction of ML, the secular correction of PL, and the secular correction of NL, are to each other in the ratio of certain numbers, which Damoiseau assumed as

$$1,\ -3{\cdot}701\,97,\ +0{\cdot}612\,06.$$

But Mr. Adams prefers the ratios determined by Plana; and these are

$$1,\ -3{\cdot}810\,37,\ +0{\cdot}644\,48.$$

It follows, that the secular correction of ML, at κ centuries before A.D. 1801, having been found from the formula above prescribed; if we multiply it by $-3{\cdot}810\,37$, it will give the secular correction of PL, required at κ centuries before A.D. 1801 also: and if we multiply it by $+0{\cdot}644\,48$, it will be the secular correction of NL, at the distance of κ centuries before A.D. 1801 likewise. And the former of these is *negative*, the latter is *positive* perpetually; i. e. the former must be subtracted from PL found from Table xvii, the latter must be added to NL found from Table xx, at κ centuries before A.D. 1801 *.

* From this direction of Mr. Adams, it will be seen that the proper sign of the secular correction of NL, anterior to A.D. 1801, is *positive*. In our own Calculations we have always assumed it as *negative*; which must consequently have been a mistake. We have not thought it worth while to correct this oversight; because it can never make a difference of more than a few seconds at last; which in a chronological point of view is utterly insignificant. In fact the whole of the equation, for which NL is wanted, (the fourth, or E''',) is so small even at its maximum, that except in calculating an eclipse it is commonly omitted altogether. The Correction required in these instances would be to subtract *twice* the amount of the secular correction of NL, from ND; and with that corrected value of ND as the argument to enter Table xxi, Part v, (Introduction, Supplementary Tables, Page xxxiii,) and take out the equation E''' afresh. In judging of the limits of an ecliptic Syzygy, this oversight would make a difference; and we now perceive that the solar eclipse, April 2, B.C. 1847, (iii. 517, 518,) would be much more considerable than we concluded. The sun would be 4° at least nearer to the node than we made it.

Mr. Adams has furnished us also with a more correct formula for the recovery of the mean synodic standard at any point of time anterior to A. D. 1801, from that of A. D. 1801 as proposed above: a change in the formula for the secular correction necessarily entailing a change in this.

$$\begin{aligned}&+\ 0^{s}{\cdot}033\,509\ \kappa\\ &-\ 0^{s}{\cdot}000\,060\,738\ \kappa^2\\ &-\ 0^{s}{\cdot}000\,000\,411\,58\ \kappa^3\end{aligned}$$

In which κ is the number of centuries before A. D. 1801; and both the latter terms are to be subtracted from the first: and the remainder with a positive sign is the correction required by the standard of A. D. 1801, at the distance of κ centuries before.

For the accommodation of formulæ, which involve successive powers of κ, or the time, from an epoch before A. D. 1801 to one after it, we have only to follow a simple and invariable rule; viz. that the terms which involve the odd powers of κ should change their sign, and those which involve the even powers should not. These different formulæ then, before and after A. D. 1801 respectively, stand as follows.

i. Correction of the Tabular value of M L	$-39''\ \kappa$	Before A. D. 1801
	$+39''\ \kappa$	After A. D. 1801
Correction of the Tabular value of P L	$-31''\ \kappa$	Before A. D. 1801
	$+31''\ \kappa$	After A. D. 1801
Correction of the Tabular value of N L	$-63''$	Before A. D. 1801
	$+63''$	After A. D. 1801
ii. Secular Correction of M L	$+10''{\cdot}526\,03\ \kappa^2$	Before A. D. 1801
	$+10''{\cdot}526\,03\ \kappa^2$	After A. D. 1801
	$-\ 0''{\cdot}012\,719\,6\ \kappa^3$	Before A. D. 1801
	$+\ 0''{\cdot}012\,719\,6\ \kappa^3$	After A. D. 1801
	$-\ 0''{\cdot}000\,064\,644\,2\ \kappa^4$	Before A. D. 1801
	$-\ 0''{\cdot}000\,064\,644\,2\ \kappa^4$	After A. D. 1801
Secular Correction of P L, obtained as above	−	Before A. D. 1801
	−	After A. D. 1801
Secular Correction of N L, obtained as above	+	Before A. D. 1801
	+	After A. D. 1801

iii. Secular Correction of the mean Synodic standard	$+\ 0^{s}{\cdot}033\ 509\ \kappa$	Before A. D. 1801
	$-\ 0^{s}{\cdot}033\ 509\ \kappa$	After A. D. 1801
	$-\ 0^{s}{\cdot}000\ 060\ 738\ \kappa^2$	Before A. D. 1801
	$-\ 0^{s}{\cdot}000\ 060\ 738\ \kappa^2$	After A. D. 1801
	$-\ 0^{s}{\cdot}000\ 000\ 411\ 58\ \kappa^3$	Before A. D. 1801
	$+\ 0^{s}{\cdot}000\ 000\ 411\ 58\ \kappa^3$	After A. D. 1801

The secular correction obtained from this formula of Mr. Adams, and that which we get from the formula of Damoiseau, in a given instance may not be materially different. For example, B. C. 4004, at the distance of 58·04 centuries before A. D. 1801, the former is $+8^{\circ}\ 57'\ 18''$; the latter, as we have seen *supra* page 623, is $8^{\circ}\ 58'\ 57''$; and we have been informed by Mr. Adams that the sum of the remaining terms in the series (which runs on itself into infinity) for that epoch is only $+38''$; so that the total amount of the correction, even for so remote an epoch, obtained from his formula, would be $8^{\circ}\ 57'\ 56''$: only $1'\ 1''$ less than that which we got from Damoiseau's. The difference is not more perceptible in the mean synodic standard, which we recover from each of our formulæ respectively.

		d.	h.	m.	s.
B. C. 4004	Formula of Damoiseau,	29	12	44	4·535
	Formula of Mr. Adams,	29	12	44	4·475
					0·060

		d.	h.	m.	s.
B. C. 1847	Formula of Damoiseau,	29	12	44	3·987
	Formula of Mr. Adams,	29	12	44	3·936
					0·051

This latter is consequently somewhat less than the standard of the Phœnix period, B. C. 1847; and than the standard of the period of 600 years, B. C. 4004; in comparison even of what we recovered from the former. We have applied however Mr. Adams' formula of this kind to the epoch of B. C. 2347, just 500 years before the first Phœnix period; and found that it gives the standard of that epoch almost the same as that of this period.

	d.	h.	m.	s.
Standard of the Phœnix period B. C. 1847	29	12	44	4·114
Standard from Formula B. C. 2347.. ..	29	12	44	4·071
				0·043

And this must be allowed to be something remarkable; B. C. 2347 being virtually the epoch of the decursus of Phœnix periods themselves.

We are also informed by Mr. Adams that, for such an epoch as B. C. 720, the correction of our Tabular mean longitude pointed out *supra* would make a difference of +33 minutes of mean solar time. Now this is nearly the difference which exists *de facto* between the dates of the three oldest lunar oppositions, B. C. 721 and B.C. 720, obtained from our Tables (Introduction, 281. 288.) and the observed times as recorded by Ptolemy. So that, when this correction is taken into account, the difference between calculation and observation in these instances is almost reduced to nothing.

In like manner the total amount of the correction of the Tabular mean longitude, April 28 B. C. 4004, we are informed would be $-39' = +1$ h. 21 m. in mean solar time; by which the new moon of the Hexaëmeron would be later than we have made it: viz. April 28, at 15h. 7m., for the meridian of Jerusalem, instead of 13h. 46m. Mr. Adams himself has calculated this new moon, and determined it to April 28 at 15h. 16m.; which differs only 9 m. from our calculation, corrected as above. And he is of opinion that this must decide the question whether that new moon could have fallen out exactly at noon for the meridian of Jerusalem; though he still considers it possible that the true time might have been an hour earlier, or an hour later, than even he has made it. On the whole, the true date of this Primary conjunction seems to be determinable to a time nearer to sunset than to noon; yet not critically even to the time of sunset. And this being the case, the mean new moon of the same epoch is determined almost critically to midnight April 29; for the meridian of Jerusalem. Mr. Adams makes it April 28 at 23h. 23m.: our calculation, corrected as above, would make it April 28 at 23 h. 54 m. 23 sec.: only 5 m. 37 sec. before midnight*.

* We have however calculated this Primary New Moon over again, from our own Tables, with Mr. Adams' corrections. The result is,

			h.	m.	s.	
Mean new moon,	April	28	21	28	52	Mean time Greenwich.
	April	28	23	49	39	Mean time Jerusalem.
True new moon,	April	28	12	49	58·2	Mean time Greenwich.
	April	28	15	10	45·2	Mean time Jerusalem.

Ἐν αὐτῇ τῇ ὥρᾳ ἠγαλλιάσατο τῷ πνεύματι ὁ Ἰησοῦς, καὶ εἶπεν· Ἐξομολογοῦμαί σοι Πάτερ κύριε τοῦ οὐρανοῦ καὶ τῆς γῆς, ὅτι ἀπέκρυψας ταῦτα ἀπὸ σοφῶν καὶ συνετῶν, καὶ ἀπεκάλυψας αὐτὰ νηπίοις· ναὶ ὁ Πατήρ· ὅτι οὕτως ἐγένετο εὐδοκία ἔμπροσθέν σου.—Evangel. secund. Lucam, x. 21.

Videor mihi debitum ingentis hujus operis, adjuvante Domino, reddidisse. quibus parum vel quibus nimium est, mihi ignoscant: quibus autem satis est, non mihi sed Deo mecum gratias congratulantes agant. Amen.—*Augustin. De Civitate Dei*, xxii. 30.

MINOR CORRECTIONS.

Vol. I. 233 last line, Tables xxxi. xxix. xxvii. P. i. read xxvi Part i. ii: xxvii : xxviii.

234 note g. Tables xxxi. xxxii. read xxx. xxxi.

— note h. Table xxvii P. i. and P. ii. read xxvi. P. i. and P. ii.

235 note k. Table xxviii. read xxvii.

258 line 4 of note, — line 9 of note } "Apparent time" read "Mean"

265 line 13, — line 14 } "at 18 hours" read "midnight"

— line 20 "earlier of the two," read "later"

301 line 25 "about 2 P. M." *corrige* "2 A. M."

302 line 2 "about 27 hours" — "15 hours"

— line 3 "about four hours" — "16 hours"

Vol. II. 115 last line "App. time" dele or read "Mean time"

178 line 5 "apparent time" read "mean time"

183 last line "appar. time" read "mean time"

201 last line "apparent time" read "mean time"

216 line 11 "apparent time" dele.

— line 6 of note, — line 11 of note } "apparent time" read "mean time"

220 line 6 of note, — line 11 of note } "apparent time" read "mean time"

INDEX,

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TABLE OF CONTENTS.

The references followed by *n* are to the Notes; by Introd. are to the Introduction.

B.

M.

Q.

R.

S

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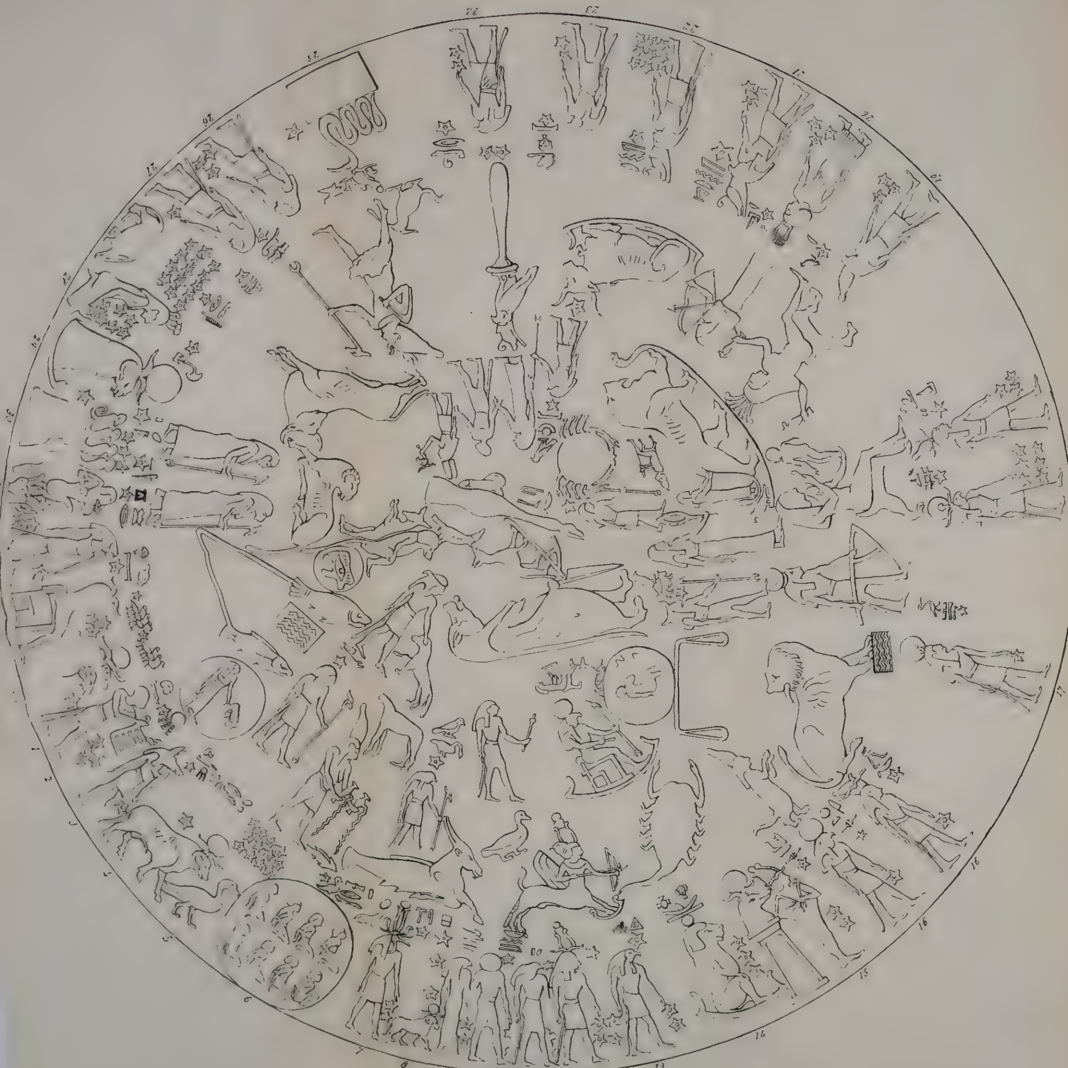
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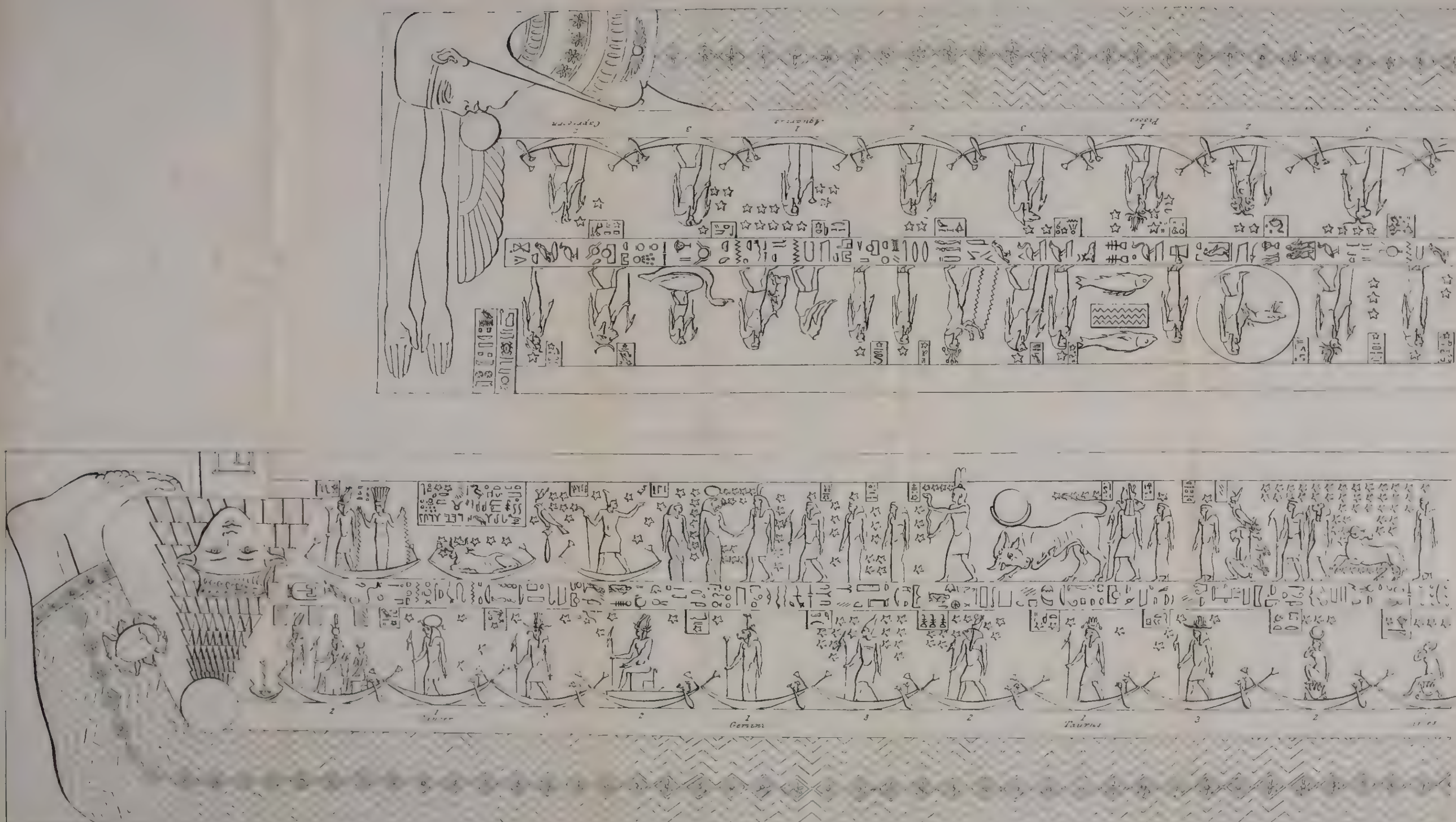
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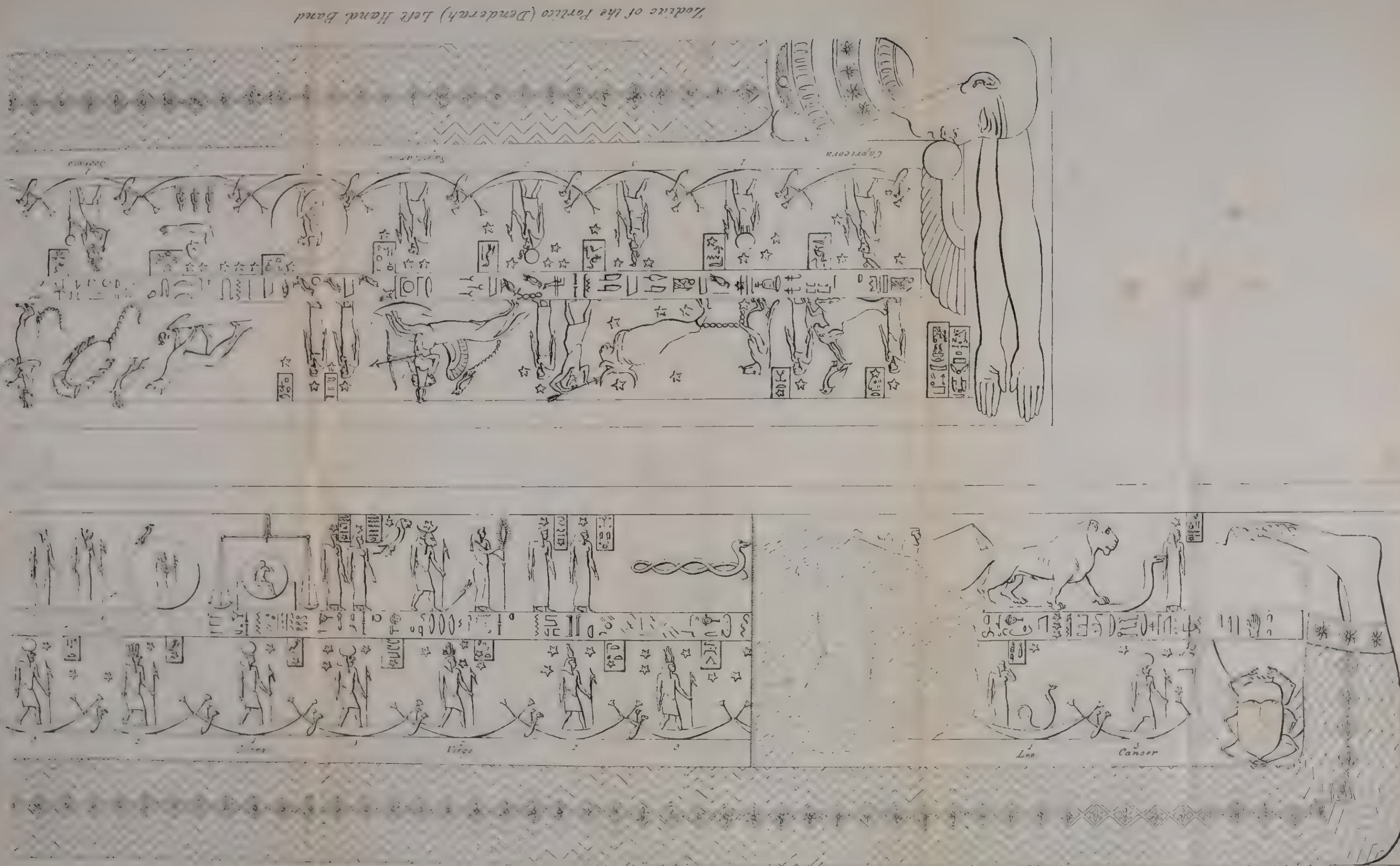
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